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Coastal Scenic Beauty and Sensitivity at the Balearic Islands, Spain: Implication of Natural and Human Factors

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Abstract: Coastal areas globally are facing a significant range of environmental stresses, enhanced by climate change-related processes and a continuous increase of human activities. The economic benefits of tourism are well-known for coastal regions, but, very often, conflicts arise between short-term benefits and long-term conservation goals. Among beach user preferences, five parameters of greater importance stand out from the rest, i.e., safety, facilities, water quality, litter and scenery; the latter is the main concern of this study. A coastal scenic evaluation was carried out in the Balearic Islands and focused on two major issues: coastal scenic beauty together with sensitivity to natural processes and human pressure. The archipelago is renowned as a top international coastal tourist destination that receives more than 13.5 million visitors (2019). Impressive landscape diversity makes the Balearics Islands an ideal field for this research. In total, 52 sites, respectively located in Ibiza (11), Formentera (5), Mallorca (18) and Menorca (18), were field-tested. In a first step, coastal scenic beauty was quantified using the coastal scenic evaluation system (CSES) method, based on the evaluation of 26 physical and human parameters, and using weighting matrices parameters and fuzzy logic mathematics. An evaluation index ("D") was obtained for each site, allowing one to classify them in one of the five scenic classes established by the method. Twenty-nine sites were included in class I, corresponding to extremely attractive sites (CSES), which were mainly observed in Menorca. Several sound measures were proposed to maintain and/or enhance sites' scenic value. In a second step, scenic sensitivity was evaluated using a novel methodological approach that makes possible the assessment of three different coastal scenic sensitivity indexes (CSSI), i.e., the natural sensitivity index *NSI*, the human sensitivity index HSI and the total sensitivity index TSI. Future climate change trends and projection of tourism development, studied at municipality scale, were considered as correction factors. All the islands showed places highly sensitive to environmental processes, while sensitivity to human pressure was essentially observed at Ibiza and Mallorca. Thereafter, sites were categorized into one of three sensitive groups established by the methodology. Results obtained are useful in pointing out very sensitive sceneries as well as limiting, preventing and/or anticipating future scenic degradation linked to natural and human issues.

Keywords: beach; landscape; scenic assessment; coastal management; climate change; tourism pressure; sustainability; Ibiza; Formentera; Mallorca; Menorca

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1. Introduction

Interest in coastal areas has been growing in the last few decades, and coastal tourist markets are today considered as one of the world's largest industries [1,2], and worldwide tourist arrivals are expected to reach USD 1.8 billion by 2030 [3]. In 2018, Southern and Mediterranean Europe led this market, recording 710 million international tourist arrivals in 2018 (51% from the European market) and incomes of USD 570 billion (39% of the total amount) [2]. Spain was the second worldwide country by international tourist arrivals and receipts [2].

Enjoying the "sun, sea and sand (3S) market" [4] is the main reason to visit beaches [5,6], and this has acquired great importance since the 20th century [7] when they started to be considered as ideal places for rest and relaxation and a very valued resource for esthetic, cultural, economic and historical reasons [8,9]. Williams [10] showed that five parameters are of the greatest significance to coastal tourists, i.e., safety, facilities, water quality, litter and scenery; and this paper mainly focuses on the latter, which is defined as "an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors" [11] (p.32). A major concern regarding scenic assessment is generally due to the inability of scenic evaluation methodologies to represent people's perceptions as Teale [12] (p. 72) claimed: "nature affects our minds as light affects a photographic emulsion on a film. Some films are more sensitive than others; some minds are more receptive." However, scenic methodologies can, in some cases, represent users' typologies, their attitude about a specific scenic class associated with the beach they frequent and the willingness to pay to preserve that scenery [13].

In this paper, in a first step, the "coastal scenic evaluation system" method (CSES) [14–16] was adopted and applied at 52 coastal scenic sites in the Balearic Islands (Spain). The method is based on evaluation of 26 natural and human parameters using fuzzy logic mathematics and parameter weighting matrices, which allow one "to overcome subjectivity and quantify uncertainties" [14] (p. 1). Therefore, the method allowed to characterize the most attractive coastal scenic sites along the investigated area, constituting thus a useful tool for their preservation and enhancement [14–16]. In a second step, a novelty methodology, based on using a coastal scenic sensitivity index (CSSI) [17], was used to determine present and future coastal scenic sites' sensitivity to both natural processes and human interventions. The main aim of CSSI is not to assess coastal systems' protection function, i.e., their capacity of reducing the sensitivity/vulnerability of landward coastal ecosystems and/or human settlements—a large literature related to these matters already exist—, but to determine the intrinsic sensitivity of coastal scenic parameters to (i) erosion/flooding processes in a climate change context and (ii) unsustainable growth very often linked to the tourism industry. It represents a powerful tool to consider the medium and long-term environmental and tourism trends/patterns to anticipate growth scenarios and increase sites' resilience of great scenic beauty.

Natural coastal evolution is the result of either inundation or erosion processes linked to both chronic wave action and the impact of specific events as storms [18,19], extra-tropical cyclones [20] and hurricanes [21–23] magnified by processes that take place at long temporal and great spatial scales, such as a sea-level rise trend [24–26]. In addition to a permanent sea-level increase, studies, such as those of Morim et al. [27] and Vousdoukas et al. [28], agreed that an increase in global temperature would also alter wave climate along with more than 50% of the world coastlines. The combined effect of permanent sea level rise (SLR) with the increase in storm surges (SS) will have significant implications for coastal areas in terms of extreme flooding and erosion processes. The present scale of coastal erosion is far from the natural one and constitutes a very relevant global problem [24,29,30].

Coastal environments are also under threat due to the pressure of people that use coastal areas for recreation, habitation and industrial purposes, and this pressure affects a particularly strategic coastal value, i.e., scenery.

Determination of scenic characteristics, conservation, protection and management has undoubtedly become a mandatory challenging issue within coastal areas [11,31–34]. In many world tourist destinations, 3S tourism has favored the total or partial urbanization of coastal areas [35–41] as was the case for several Mediterranean Spanish coastal sectors where the built-up zone exceeds 45%, stark evidence of the great contemporary necessity of the improvement of sustainable tourism [42–45], which is based on four principles:

(i) Natural and cultural resources must be preserved for future use;
(ii) Tourism development must be planned and managed with environmental and socio-cultural responsibility;
(iii) The importance of guaranteed visitor satisfaction to preserve the prestige and commercial potential of the destination;
(iv) The benefits of tourism are widely shared throughout society [46–48].

Therefore, coastal scenic evaluation is an important tool for managers/planners for coastal preservation, protection and development, as evaluation outcomes provide baseline information and a scientific basis for any envisaged development plan in landscape conventions. In addition, the maintenance of the naturalness of undeveloped coasts must be regarded as a strategic policy issue and an important long-term goal for coastal stakeholders to avoid irreversible damage [49].

2. Study Area

The Balearic Islands are located in the Western Mediterranean Sea near the eastern coast of the Iberian Peninsula (Figure 1). The archipelago comprises five major islands and 151 minor islands and islets [50], covering a surface of 5061 km^2 with a total coastline length of 1724 km [51]. The four largest and inhabited islands–Mallorca (with 783 km of coastal length), Menorca (433 km), Ibiza (334 km) and Formentera (115 km)—cover more than 99% of the global surface and show a wide variety of coastal scenery [51] (Figure 1).

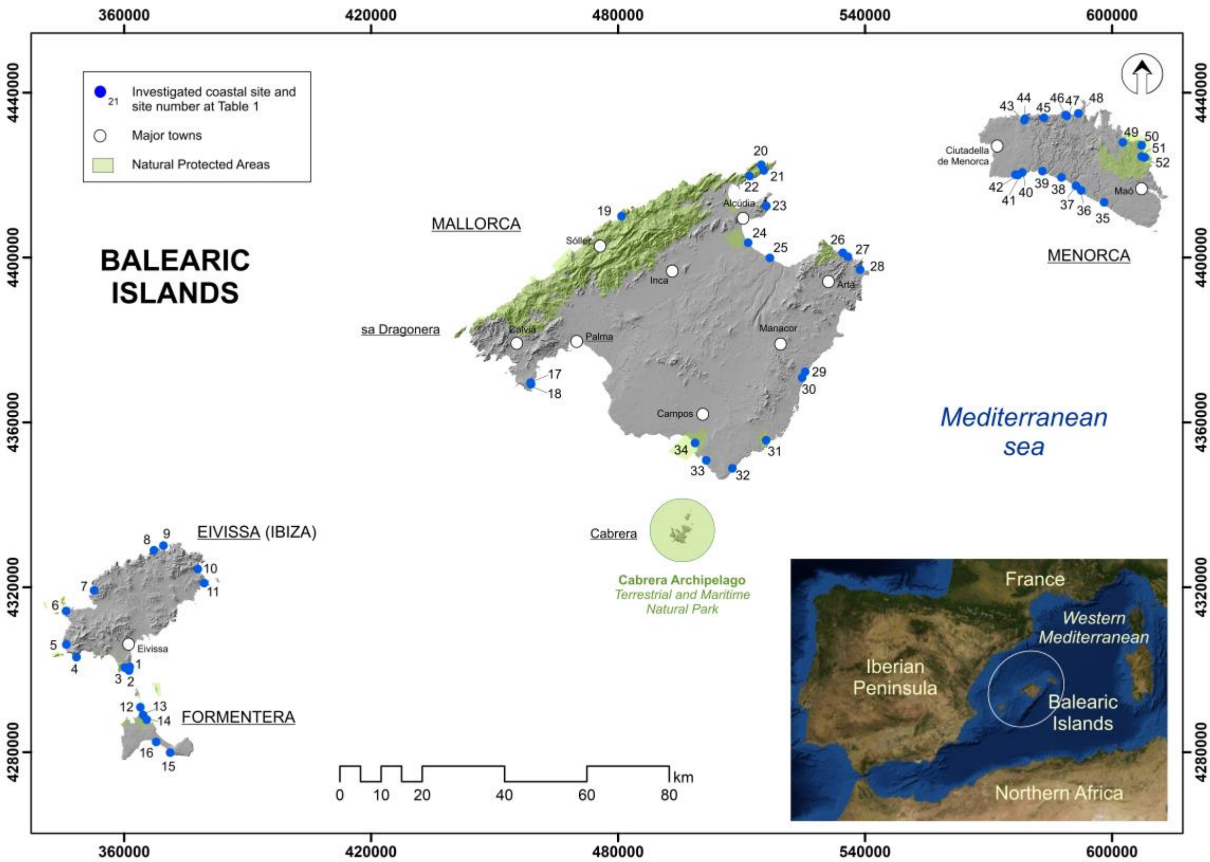

Figure 1. Location map of investigated sites at the Balearic Islands.

The archipelago is the emerged part of the Balearic foreland, a thick continental crustal unit that constitutes the NE continuation of the Alpine Betic thrust and fold belt build during the Middle Miocene [52]. From a geomorphological viewpoint, the Balearic rocky coast dominates along the shoreline of the Balearic Islands. Sandy beach systems constitute 10% of the total coastline length, but there are some differences between islands. In Formentera, the sandy coast exceeds 15% of the total length, while in Ibiza and Menorca, the presence of gravel, boulder and mixed beaches almost reaches 20% [53]. According to Gomez-Pujol et al. [54], the common Balearic beach is relatively narrow, usually located at the seaward edge of a narrow wall-sided embayment, and shows features, such as reefs, rocks and islets. Beach length ranges from 5 m to 4.9 km (average value: 169 m), but in 93% of the cases, the beaches are not larger than 500 m. Pocket and semi-enclosed beaches represent more than 60% of the total beach typologies, whereas open beaches exposed to wave action constitute 27% [54]. The largest ones usually appear very close to coastal basins or structural elements forming beach barriers fronting lagoons, e.g., Ses Salines and Es Cavallet in Ibiza or Llevant Nord in Formentera.

The Balearic Islands exhibit a varied morphology as they include extensive plains and lowlands, wetlands, coastal lagoons, but their coastal physiography is clearly dominated by undulating and mountainous landforms belonging to the sub-Betic system. The Serra de Tramuntana stands out from the rest and forms the backbone of Mallorca, running for around 90 km along the northern coast and covering 30% of the island territory with several peaks > 1000 m in height, providing exceptional coastal scenery (e.g., Cala Tuent). The mountain ridge was declared a World Heritage Site in 2011 under the Cultural Landscape category [55]. Rainfall is generally quite low, rarely exceeding 450 mm/y and is mainly concentrated in spring and autumn following the Mediterranean climatic pattern. At sea level, the daily average temperature varies from 9 to 11 °C in winter to about 24 °C in summer [56]. According to Köppen's climate classification, the coastal areas of Menorca, northern and eastern coasts of Mallorca and Ibiza, are categorized as "Csa" (Mediterranean climate), while Formentera and the southwestern coasts of Mallorca and Ibiza are classified as "BSk" (cold semi-arid) [57].

The coastal environment is microtidal (spring range less than 0.25 m) and exposed to moderate winds with short period waves. Sea climate has been frequently identified as the result of a complex pattern. Storms are generally forced by northerly winds (Tramontane and Mistral) during almost the entire year, while the eastern coasts are usually characterized by a high seasonal variability [54]. The most frequent and high-energy storm events approach from the northern quadrant, and the maximum significant wave height hardly exceeds 4 m [58,59]. Nevertheless, anomalous storms, such as Gloria in 2019, have registered wave heights > 15 m [60]. In 2019, the Balearic Islands had 1,149,460 inhabitants—Mallorca (78%), Ibiza (13%), Menorca (8%) and Formentera (1%), 18% of whom were foreigners [61]. The most densely populated islands are Ibiza (258 inhabitants/km^2), followed by Mallorca (247 inhabitants/km^2), while Menorca and Formentera show population densities lower than <150 inhabitants/km^2 [61]. Since the 1950s, the structural economic activity has been based on the Sun, Sea and Sand (3S) tourism market focused on beaches, recreational and leisure activities that have resulted in an extensive urbanization process and development of coastal tourist resorts along the main beach locations [62,63]. The Balearic Islands are the key point for the Spanish tourism economy in terms of visitors—in 2019, the islands received around 13.6 million visitors [64]; more than 10 times the resident population—and the largest in terms of tourist accommodation, accounting for one-third of Spanish tourist rooms, making the Balearic archipelago one of the most popular tourist destinations in Europe [65]. From a coastal management viewpoint, the Balearic Islands have suffered an intense process of urbanization since the beginning of the mass tourism development that caused huge degradation of coastal sandy systems (mainly coastal dune systems) and created a strong necessity of periodic beach nourishment projects [66].

Today, around 73% of its coastal length is under protection [67], combining many types of sites designations, e.g., at regional (e.g., *Àrea Natural de Especial Interès*, ANEI, in

Catalan), national (e.g., national natural park), European (Natura 2000 sites) or international relevance (e.g., UNESCO, biosphere reserve), with a wide typology of coastal sectors, from areas managed in a permissive way to areas where access and use are very strictly regulated.

Many substantial differences among islands stand out, such as population density and typology of human settings, size, geomorphology, beach sediment characteristics or wave exposition, among others. The Balearic Islands' international reputation and landscape diversity make the assessment of their coastal scenic beauty and sensitivity a necessity for its conservation and preservation.

3. Methods

This paper is based on an evaluation of the most attractive coastal scenic sites and their susceptibility to natural processes and human impacts. The analysis is carried out by applying two methodological approaches: (i) coastal scenic evaluation system (CSES): (ii) coastal scenic sensitivity index (CSSI). Satellite images and land cover viewers were used to eliminate urbanized areas and give a first approximation of the location of beautiful natural areas. As established in Mooser et al. [68], sites accessible by a long walk > 1.5 h were omitted. Consequently, field visits were planned to choose and survey what appeared to be natural and attractive sites despite them being located in protected areas or not. Field observations were carried out in June 2020 between 10 a.m. and 6 p.m., during normal weather conditions when stable conditions ruled (e.g., storms could influence the "water color" parameter) and over 400–500 m beach sectors. An overview of used methods and parameters is presented in Figure 2.

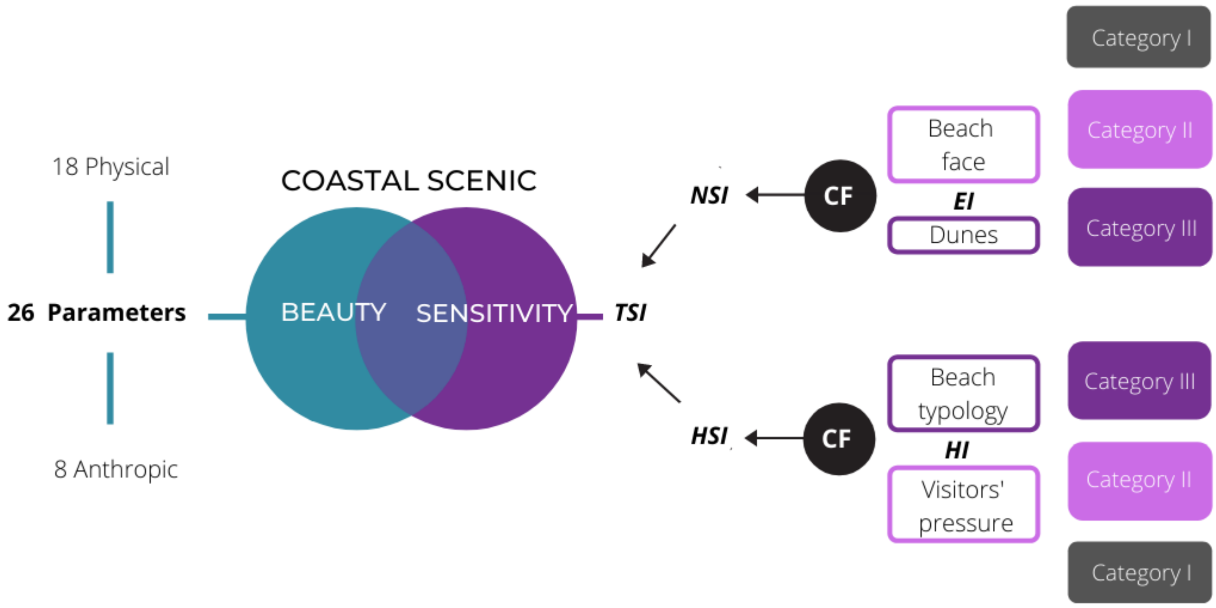

Figure 2. Overview of methods and parameters used for CSES and CSSI.

The **coastal scenic evaluation system** (CSES) [14] was used to assess the coastal beauty of the most attractive sites. The method is based on the results of a three-year research project [69], which was later rewritten and published by Ergin et al. [14,16]. To establish the most important coastal scenic aspects, i.e., the establishment of the best/ugliest coastal scenery, more than 1000 beachgoers, chosen by random number tables, were interviewed on different beaches in Turkey, Malta, Croatia, Portugal and the UK.

Assessment results established the number of times a parameter was pointed out, and the answers condensed down to 26 "coastal scenic assessment parameters", presented in Table 1. Further beach interviews were then undertaken in the same countries (n $\geq$ 500) to rank the 26 parameters obtained during the first round of surveys. The results enabled a weighting parameter to be introduced since not all parameters had the same value.

A further step consisted of determining the attribute values, from low (1) to high (5) rating, i.e., 1 corresponds to absence/poor quality and 5 excellent quality. Lastly, a fuzzy logic methodology (FLA) was used to reduce the possibility of the scenic value assessor ticking the wrong attribute box in the 26 parameters checklist, e.g., cliff height can be absent (rated 1), present a height between 5 and 30 m (2), 30–60 m (3), 60–90m (4) or >90 m (5) (Table 1). The FLA approach overcomes the problem, e.g., a cliff height being recorded in the 30–60 m box when in reality, it was >90 m. It is extremely improbable that a jump of two attributes will be checked. All such aspects are presented in detail by Ergin et al. [14]. The method was successfully field-tested in many countries, such as New Zealand, Australia, Japan, the USA, the South Pacific, Pakistan, Cuba and other countries [15,70–73].

After the fieldwork, data were graphically presented as histograms, a weighted average of attributes and membership degree of attributes (see later). Histogram figures provide a visual summary of both physical and human parameters obtained from Table 1 scores and are very useful to easily assess high and low rated attributes. Membership degree vs. attribute curve represent overall scenic assessment over the attributes, and weighted averages of attributes delineated relative comparison of physical and human parameters. All the above enabled a scenic evaluation decision value "D" for each site to be obtained. These can be categorized into five distinct classes, from class I, extremely attractive natural sites with very high landscape values and an evaluation index $\geq$ of 0.85 to class V, very unattractive urban sites with intensive development, a low landscape value and a "D" value below zero. A detailed description can be found in Anfuso et al. [74] that presented ca. 1000 sites around the world. In this study, sites belonged to classes I, II and III.

The **coastal scenic sensitivity index** (CSSI) [17] was used to determine:

(i) The intrinsic sensitivity of coastal scenic natural parameters indexes (Table 1) to erosion/flooding processes in a scenario of increasing coastal energy linked to climate change, and

(ii) Human parameters indexes (Table 1) sensitivity to human pressure/activities in a scenario of increasing visitor pressures and human coastal occupation, according to the level of protection (e.g., natural park, etc.).

Concerning the scenic sensitivity of the natural parameters (NSI), Mooser et al. [17] established that "beach face" and "dune" (points 4–6 and 10, Table 1) were the most susceptible to marine processes. In the first step, investigated sites were divided into 3 categories according to the presence/absence of the two mentioned parameters (Figure 2). An "erodibility index" (EI) was later employed in a second step to calculate the level of sensitivity of sites belonging to each category, which was defined on a 1–5 scale (Table 2 and Figure 2). In a third step, a "correction factor" (CF) was used to predict the future effects of energy factors in a climate change scenario. Lastly, in a fourth step, a "natural sensitivity index" (NSI) was employed to calculate the final sensitivity of natural parameters considering all the above (Table 2 and Figure 2), in a 0–1 range of values, and three sensitive groups were obtained:

- Group I: NSI < 0.33 (not sensitive);
- Group II: 0.33 $\geq$ NSI < 0.66 (sensitive);
- Group III: NSI $\geq$ 0.66 (very sensitive).

Table 1. Natural and human parameters for scenic beauty assessment (CSES method).

No	Physical Parameters		Weight	Rating				
				1	2	3	4	5
1	Cliff	Height (m)	0.02	Absent	$5 \leq H < 30$	$30 \leq H < 60$	$60 \leq H < 90$	$H \geq 90$
2		Slope	0.02	<45°	45–60°	60–75°	75–85°	circa vertical
3		Features *	0.03	Absent	1	2	3	Many (>3)
4	Beach face	Type	0.03	Absent	Mud	Cobble/boulder	Pebble/gravel	Sand
5		Width (m)	0.03	Absent	$W < 5$ or $W > 100$	$5 \leq W < 25$	$25 \leq W < 50$	$50 \leq W \leq 100$
6		Color	0.02	Absent	Dark	Dark tan	Light tan/bleached	White/gold
7	Rocky shore	Slope	0.01	Absent	<5°	5–10°	10–20°	20–45°
8		Extent	0.01	Absent	<5 m	5–10 m	10–20 m	>20 m
9		Roughness	0.02	Absent	Distinctly jagged	Deeply pitted and/or irregular	Shallow pitted	Smooth
10	dunes		0.04	Absent	Remnants	Fore-dune	Secondary ridge	Several
11	Valley		0.08	Absent	Dry valley	(<1 m) Stream	(1–4 m) Stream	River/limestone gorge
12	Skyline landform		0.08	Not visible	Flat	Undulating	Highly undulating	Mountainous
13	Tides		0.04	Macro (>4 m)		Meso (2–4 m)		Micro (<2 m)
14	Coastal landscape features **		0.12	None	1	2	3	>3
15	Vistas		0.09	Open on one side	Open on two sides		Open on three sides	Open on four sides
16	Water color and clarity		0.14	Muddy brown/gray	Milky blue/green	Green/gray/blue	Clear/dark blue	Very clear turquoise
17	Natural vegetation cover		0.12	Bare (<10% vegetation)	Scrub/garigue (marran, gorse)	Wetlands/meadow	Coppices, maquis (±mature trees)	Varity of mature trees
18	Vegetation debris		0.09	Continuous (>50 cm high)	Full strand line	Single accumulation	Few scattered items	None
Human Parameters								
19	Noise disturbance		0.14	Intolerable	Tolerable		Little	None
20	Litter		0.15	Continuous accumulations	Full strand line	Single accumulation	Few scattered items	Virtually absent
21	Sewage discharge evidence		0.15	Sewage evidence		Same evidence (1–3 items)		No evidence of sewage
22	Non-built environment		0.06	None		Hedgerow/terracing/monoculture		mixed cultivation ± trees/natural
23	Built environment		0.14	Heavy Industry	Heavy tourism and/or urban	Light tourism and/or urban	Sensitive tourism and/or urban	Historic and/or none
24	Access type		0.09	No buffer zone/heavy traffic	No buffer zone/light traffic		Parking lot visible from the coastal area	Parking lot not visible from coastal area
25	Skyline		0.14	Very unattractive		Sensitively designed high/low	Very sensitively designed	natural/historic features
26	Utilities ***		0.14	>3	3	2	1	None

* cliff special features: indentation, banding, folding, screes, irregular profile; ** coastal landscape features: peninsulas, rock ridges, irregular headlands, arches, windows, caves, waterfalls, deltas, lagoons, islands, stacks, estuaries, reefs, fauna, embayment, tombola, etc.; *** utilities: power lines, pipelines, street lamps, groins, seawalls, revetments, leisure facilities, etc.

Table 2. Parameters and correction factors used to assess natural sensitivity index (CSSI method).

Indexes and CF		Parameter			Null/Very Low (1)	Low (2)	Medium (3)	High (4)	Very High (5)
Natural sensitivity index	Erodibility index	Beach face	Dry beach as a multiple of the ICZ		Accretion/ >5 times ICZ	4 times ICZ	3 times ICZ	2 times ICZ	≤ICZ
			Sediment grain size		Gravel/pebbles		Medium/ coarse sand or mixed		Fine sand
			Rocky shore	Width	>80	80–60	60–40	40–20	<20
				Location	Nearshore		Foreshore		Absent
		Dunes *	Dune height (m)		≥6	≥3	≥2	≥1	<1 or absent
			Dune width (m)		>100	>75	>50	>25	<25
			Vegetation cover		Complete with fixed dune (forest)	Complete with fixed dune (shrub)	Semi-complete (without fixed dune)	Semi-completed (without embryo dune)	Incomplete or absent
			Washovers (%)		0	≤5	≤25	≤50	≥50
	Correction factor	Forcing	Significant wave height (m)		<0.75		0.75–1.5		>1.5
			Angle of approach		10–45° (oblique)		0°–10° (subparallel)		0° (Parallel)
			Tidal range		Macrotidal		Mesotidal		Microtidal
		Trends	Sea level rise (cm) **		<0		0–40		>40
			Storm surge (m) ***		<1.5		1.5–3		>3

With respect to the sensitivity of human parameters, Mooser et al. [17] considered that many visitors could directly affect "noise disturbance", "litter" and "sewage discharge evidence" (points 19–21, Table 1) meanwhile "non-built environment", "built environment", "access type" and "utilities" parameters (points 22–24 and 26, Table 1), were mainly linked to the protection feature of the site (if any) and "skyline" (point 25, Table 1) to the level of urbanization of surrounding areas.

In a first step, sites investigated were categorized among one of the three pre-established categories (Table 3 and Figure 2) according to the level and typology of human pressure, which is often related to land use and beach typology.

Table 3. Parameters and correction factor used to assess the human sensitivity index (CSSI method).

Indexes and CF			Parameter		Null/Very Low (1)	Low (2)	Medium (3)	High (4)	Very High (5)
Human sensitivity index	Human impact index	Visitor pressure	Access difficulty (min.)		>45 or only accessible by sea	25–45	10–25	5–10	<5
			Protected area management category		Ia–Ib	II–III	IV-V-VI	Only local designation	No
			Tourism intensity rate and population density *	TIR: tourist beds per 1000 inhabitants	<150	150–300	300–500	500–700	>700
				PD: persons per km2	<70	70–150	150–300	300–700	>700
		Beach typology **			Remote		Rural		Village or resort
	Correction factor	Evolution of the number of beds in tourist establishments (%) *			Decrease >10%	Minor decrease 0–10%	Increase 0–20%	20–40	>40

* values presented for these parameters were slightly modified from the original method [17]. ** only for category III sites.

In a second step, the human impact index (HI, Table 3, Figure 2), based on "visitors pressure" and "beach typology" that have a side effect on the 8 human parameters of the CSES method (Table 1), was calculated and sites classified on a 1–5 scale.

In a third step, a "correction factor" (CF, Table 3) for human pressure was determined considering the tourism trend at investigated sites.

A fourth step was the determination of the "human sensitivity index" (HSI), obtained to reflect the final sensitivity to human pressure, and sites were classified into three sensitive groups, following the same standard established to determine the sensitivity to natural processes.

Finally, a "total sensitivity index" (TSI) was obtained, combining scores previously calculated for NSI and HSI. Once again, sites were divided into one of the three scenic groups described above. Equations employed for the assessment of the EI, NSI, HI, HSI, TSI indexes and correction factors (natural and human) are presented in Table A1 Appendix A, and a detailed description of concepts and parameters used can be found in Mooser et al. [17].

4. Protected Areas in the Balearic Islands: Legal Framework and Planning Instruments

This paper aims to characterize the coastal landscape, analyze sites' scenic sensitivity and propose sound management strategies to improve/preserve their beauty. For this purpose, it is of paramount importance to understand the complex legal framework and tools that regulate the study area. The main administration laws, competencies and structures that affect coastal management at the Balearic Islands are listed below.

- The Spanish coastal law, 2/2013, updated of original law 22/1988 (*Ley de Costas* in Spanish); Ministry for the Ecological Transition and the Demographic Challenge;
- Counsel of environment and territories (*Conselleria de Medi Ambient i Territori* in Catalan) and Subunits, among others, general directorates (natural protected areas and biodiversity, landscape and territory), committees and agencies; the regional government of Balearic Islands (*Govern Balear*);
- Insular councils competencies and departments, e.g., departments of *Sostenibilitat i Medi Ambient* (Mallorca), *Medi Ambient i Reserva Biosfera* (Menorca), *Presidència i Gestió Ambiental* (Ibiza) and *Urbanisme i territori, Turisme i Activitats econòmiques* (Formentera) in Catalan;
- Territorial planning instruments. Among others, the territorial planning guidelines (*Directrices de Ordenacion Territorial DOT* in Spanish), insular territorial plans (*planes Territoriales Insulares PTI*) and master sectorial plans (*planes Directores Sectoriales PDS*).

Relevant protected areas usually entail specific management plans with zoning policies. All investigated sites (apart from Formentor in Mallorca) were situated in protected areas totally or partially covered by different designations applied at regional (such ANEI), national (e.g., natural park), European (Natura 2000) or international level (e.g., biosphere reserve). Details of site designation type are provided in Table 4. As a way of illustrating the management complexity of protected areas, a Spanish natural park, such as Ses Salines, uses different tools, i.e., the plan of management of natural recourses (*Plan de Ordenación de los Recursos Naturales*, PORN, in Spanish) and the master plan of administration and use (*Plan Rector de Uso y Gestión*, PRUG, in Spanish), both defined by the Act 4/89. PORN plans to characterize land use activities and natural resources and suggests conservational measures to develop suitable socioeconomic activities within a determined area. PRUG is the functional and administrative tool used by managers and requires revision every six years. According to Law 5/2005 for the conservation of sites of environmental relevance (LECO), PRUG actions demand an Annual plan approved by the competent environmental administration.

Table 4. Location and general site characteristics: name, municipality, island, designation types of protected areas (PA), "D" value with corresponding scenic class, CSSI (NSI, HSI, TSI) and group (G).

Site	Municipality	Island	Designation Types (PA) *	CSES		Sensitivity			
				D	Class	NSI	HSI	TSI	G
1. Es Cavallet	San Josep de Sa Talaia	Ibiza	NP, SAC and SPA Ses Salines (Ramsar wetland for Es Cavallet)	0.82	II	0.49	0.50	0.50	II
2. Cala Ses Salines				0.88	I	0.77	0.44	0.61	II
3. Ses Salines				0.84	II	0.63	0.53	0.58	II
4. Cala Llentrisca			SCI Cap Llentrisca–Sa Talaia, ANEI	0.62	III	0.39	0.38	0.39	II
5. Cala d'Hort				0.64	III	0.91	0.63	0.77	III
6. Cala Comte			ANEI	0.63	III	0.72	0.67	0.70	III
7. Cala Saladeta	Sant Antoni de Portmany		ANEI	0.72	II	0.64	0.51	0.58	II
8. Caló de S'Illa	Sant Joan de Labritja		SCI Xarraca, ANEI	0.68	II	0.39	0.44	0.42	II
9. Punta Llevant				0.97	I	0	0.38	0.19	I
10. Aigües Blanques	Santa Eularia des Riu		ANEI	1.06	I	0.72	0.66	0.69	III
11. Cala Boix			ARIP	0.69	II	0.64	0.76	0.70	III
12. Trucadors	Formentera		NP, SAC and SPA Ses Salines	0.90	I	0.46	0.38	0.42	II
13. Punta Alta				0.98	I	0.58	0.50	0.54	II
14. Llevant Nort				0.86	I	0.67	0.50	0.59	II
15. Caló des Morts			SCI and SPA La Mola, ANEI	0.77	II	0.70	0.50	0.60	II
16. Cala Es Arenals			ANEI	0.91	I	0.58	0.69	0.64	II
17. Portal Vells 1	Calvia	Mallorca	SPA and SCI Cap de Cala Figuera, ANEI	0.62	III	0.80	0.76	0.78	III
18. Portal Vells 2				0.63	III	0.77	0.72	0.75	III
19. Cala Tuent	Escorca		WHS; N.Pl Sierra Tram.; ANEI	1.00	I	0.64	0.30	0.47	II
20. Cala Figuera	Pollença		WHS, N.Pl, SPA Costa Brava, ANEI (natural reserve at Cala Figuera)	0.87	I	0.36	0	0.18	I
21. Cala Murta				0.85	I	0.55	0.38	0.47	II
22. Formentor			None	0.77	II	0.89	0.71	0.80	III
23. Es Coll Baix	Alcudia		SCI and Spa La Victoria, ANEI	1.10	I	0.42	0.47	0.45	II
24. Es Comú de Muro	Muro		NP, SAC and SPA Albufera de Mallorca, ANEI	0.86	I	0.63	0.53	0.58	II
25. S'Arenal d'en Casat	Santa Margalida		SPA Son Real, ANEI	1.05	I	0.42	0.47	0.45	II
26. Cala Matzoc	Arta		SPA and SCI Muntanyes d'Artà, ANEI	0.96	I	0.52	0.13	0.33	II
27. Cala Torta				0.90	I	0.63	0.25	0.44	II
28. Cala Agulla	Capdepera			0.54	III	0.54	0.59	0.57	II
29. Cala Varques	Manacor		SCI Cales de Manacor, ANEI	0.81	II	0.63	0.44	0.54	II
30. Cala Magraner				0.93	I	0.38	0.38	0.38	II
31. S'Amarador	Santanyi		NP, SAC and SPA Mondragó, ANEI	0.66	II	0.68	0.47	0.58	II
32. Cala Marmols			SPA and SCI Cap de ses Salines, ANEI	0.80	II	0.48	0.34	0.41	II
33. Es Carbo	Ses Salines			0.89	I	0.44	0.41	0.43	II
34. Es Trenc	Campos		NP, SAC and SPA Es Trenc-Salobrar de Campos, ANEI	0.63	III	0.66	0.53	0.60	II
35. Cales Coves	Alaior	Menorca	BR, SCI and SPA Des Canutells a Llucalari, ANEI	0.75	II	0.55	0.47	0.51	II
36. Cala Llucalari			BR, SCI and SPA Son Bou i barranc de sa Vall, ANEI	0.69	II	0.64	0.41	0.53	II
37. Son Bou				0.72	II	0.58	0.53	0.56	II
38. Binigaus	Es Migjorn Gran		BR, SCI and SPA De Binigaus a cala Mitjana, ANEI	1.02	I	0.77	0.50	0.64	II
39. Cala Mitjana	Ferreries			0.95	I	0.78	0.50	0.64	II
40. Cala Turqueta	Ciutadella de Menorca		BR, SCI and SPA Costa Sud de Ciutadella, ANEI	0.86	I	0.81	0.56	0.69	III
41. Cala des Talaier				0.92	I	0.83	0.50	0.67	III
42. Son Saura				0.82	II	0.54	0.56	0.55	II
43. Es Tancats			BR, SCI and SPA La Vall, ANEI	1.07	I	0.40	0.63	0.52	II
44. Es Bot				1.13	I	0.55	0.50	0.53	II
45. Cala del Pilar				0.93	I	0.61	0.44	0.53	II
46. Cala Pregonda	Es Mercadal		BR, SCI and SPA Dels Alocs a Fornells, ANEI	1.01	I	0.49	0.45	0.47	II
47. Cala Salairó				0.78	II	0.44	0.38	0.41	II
48. Cavalleria				0.92	I	0.57	0.50	0.54	II
49. Mongofra	Mahón		BR (zoning 1 as Core Area); NP S'albufera des Grau (T and M); SCI and SPA D'Addaia a s'Albufera, ANEI	1.00	I	0.47	0	0.24	I
50. Cala Tortuga				0.86	I	0.55	0.31	0.43	II
51. Cala Rambles				0.68	II	0.57	0.25	0.41	II
52. Cala Tamarells des Nord				0.97	I	0.42	0.31	0.37	II

* List of acronyms used for the following designation types: World Heritage Site (WHS), biosphere reserve (BR)—all sites in Menorca are located in BR zoning 2 as buffer zone, except sites 49 to 52 (zoning 1), natural park (NP), natural place (N.Pl.; *Paraje natural* in Spanish), special area of conservation (SAC), site of community importance (SCI), special protection area (SPA) for birds—the three later belong to the Natura 2000 network—*Área natural de Especial Interés* (ANEI) and *Área Rural de Interés Paisajístico* (ARIP) both in Spanish.

Ses Salines also counts with a Natura 2000 Management Plan since it is a special area of conservation (SAC) and a special protection area (SPA), under the Birds Directive 79/409/CEE. This is also the case for S'Amarador (Mondragó Natural Park), Es Trenc (Es Trenc-Salobrar Natural Park), Calas Tuent, Figuera and Murta (Tramontana natural Place), or Es Comú de Muro (S'Albufera Natural Park), all of them located in Mallorca, or Calas Tortuga, Rambles, Tamarells des Nord and Mongofra in Menorca (S'Albufera Natural Park).

For sites located only under the regional designation type ANEI (or ARIP, i.e., Cala Boix), without any specific management plan, land use is defined by urban Law 1/91 and reproduced by their respective insular territorial planning. Finally, some protected areas, such as Ses Salines, are also managed by a board commission (*Patronato* in Spanish) composed of administrative and private owners. At many places, and particularly in Ibiza, conflict arises between conservation and recreational activities. CSES and CSSI scores are also included in Table 4.

5. Results and Discussion

5.1. Coastal Scenic Beauty

5.1.1. Examples of Investigated Sites

Three examples were chosen to show each one of the scenic classes recorded in this study (Figure 3). Ratings, averages and membership degree curves obtained at selected examples are presented in Figures 4–6, which gave an immediate visual state of scores obtained at natural and human parameters.

(a) Class I

Class I corresponds to extremely attractive natural sites with very high scenic values and a D $\geq$ 0.85 [12]. The 29 sites that belong to this class were located in remote areas, i.e., accessible by walking up to 300 m or by boat [10], showing excellent ratings in natural and human parameters. For example, Mongofra (Menorca), located within the natural park Albufera des Grau, the core area of the Menorca Biosphere Reserve (zoning 1), shows a very high scenic diversity with excellent scores at several physical parameters, e.g., cliff and beach characteristics, dune system (i.e., an impressive climbing dune, P.10, rated 5, Table 1), high vegetation cover (linked to pine-forest), undulating landform and several special landscape features linked to coastal morphology: the presence of reefs, cliffs on the back of the beach and rocky edges (Figure 4A). Regarding human aspects, Mongofra has the top rating for all parameters except "utilities" due to the presence of an old white recreational structure located behind the fore-dune and visible from the beach. A long walk up to 1 h, along the famous *Grande Randonnée* (GR) "Cami de Cavalls", is required to reach the site from the closest parking spot. Weighted averages, histograms, and attribute curves, skewed to the right, clearly reflect the good scores obtained at ratings "4" and "5" (Figure 4B,C).

(b) Class II

The CSES method defines class II as attractive natural sites with high scenic values and 0.65 $\leq$ D < 0.85. Most of the 16 locations that belong to this class were located in remote (7) and rural areas (7). Herein, the famous Mallorquin beach, Formentor (D: 0.77), located in front of a resort complex with the same name, was chosen as an example. Good scores for physical parameters were observed; standing out were beach type and color (gold sand), turquoise water, high vegetation of pines close to the shoreline (despite the resort presence), very undulating landform and several islets and islands visible from the bay (such as Menorca), counting as "special landscape features" (Figures 3B and 5A). Concerning human aspects, were observed little noise disturbance was observed and few scattered items, both related to beach users. Recreational areas and terraces among the pines and few constructions linked to the resort complex were moderately visible from the beach and reflected in "built" and "non-built environment". Finally, rating a "2" for "utilities" due to the presence of beach umbrellas, a seawall emplaced at the original dune toe to replace its protection function and a beach aid station considerably affected natural landscape beauty. Attributes and weighted averages obtained at human parameters can be observed in Figure 5A–C.

Figure 3. Examples of sites classified in classes I, II and III, respectively, Mongofra, Menorca (**A**), Formentor, Mallorca (**B**) and Cala d'Hort, Ibiza (**C**).

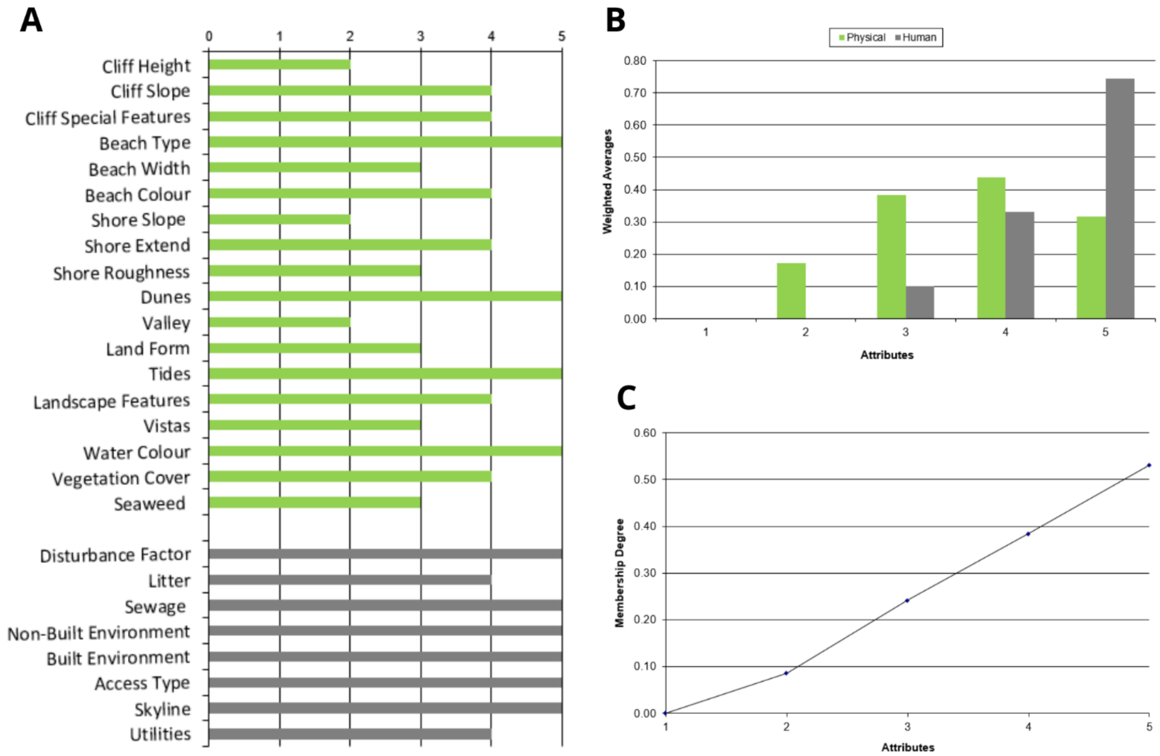

Figure 4. CSES parameters ratings for Mongofra, Menorca (D: 1.00; class I) (**A**), weighted averages vs. attributes (**B**) and membership degree vs. attributes (**C**).

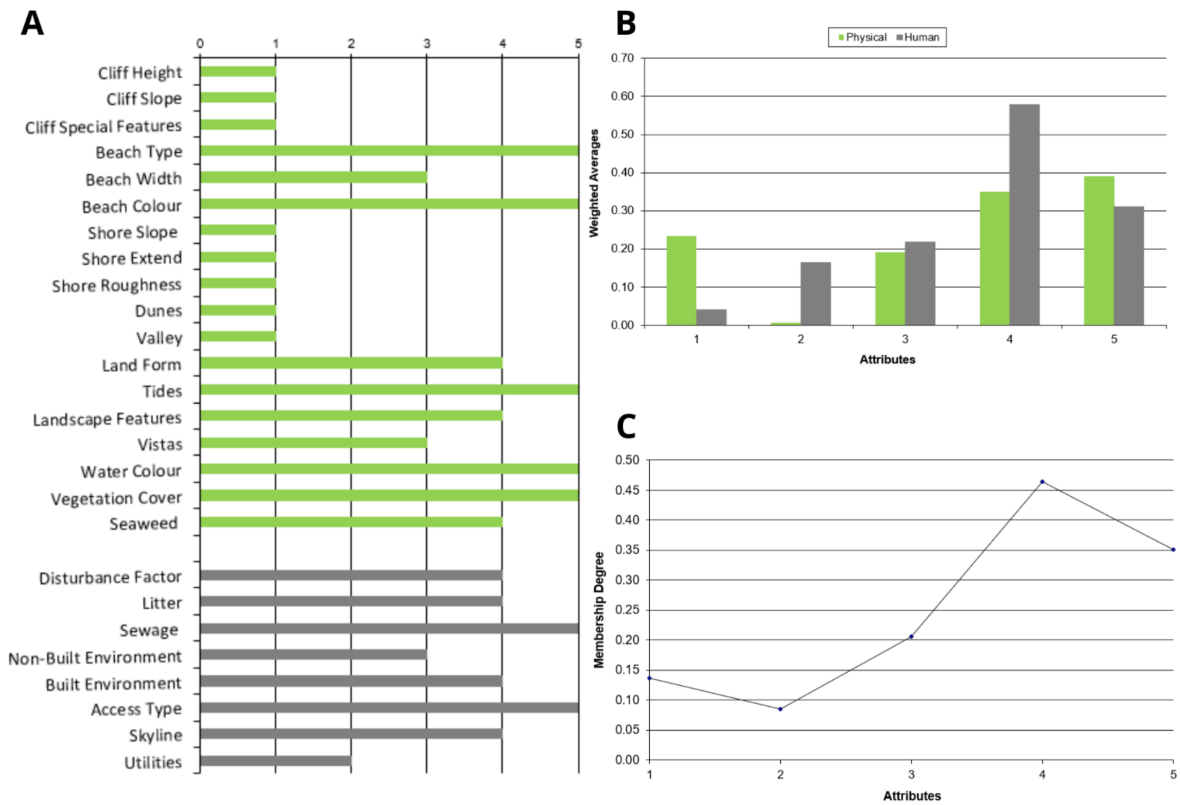

Figure 5. CSES parameters ratings for Formentor, Mallorca (D: 0.77; class II) (**A**), weighted averages vs. attributes (**B**) and membership degree vs. attributes (**C**).

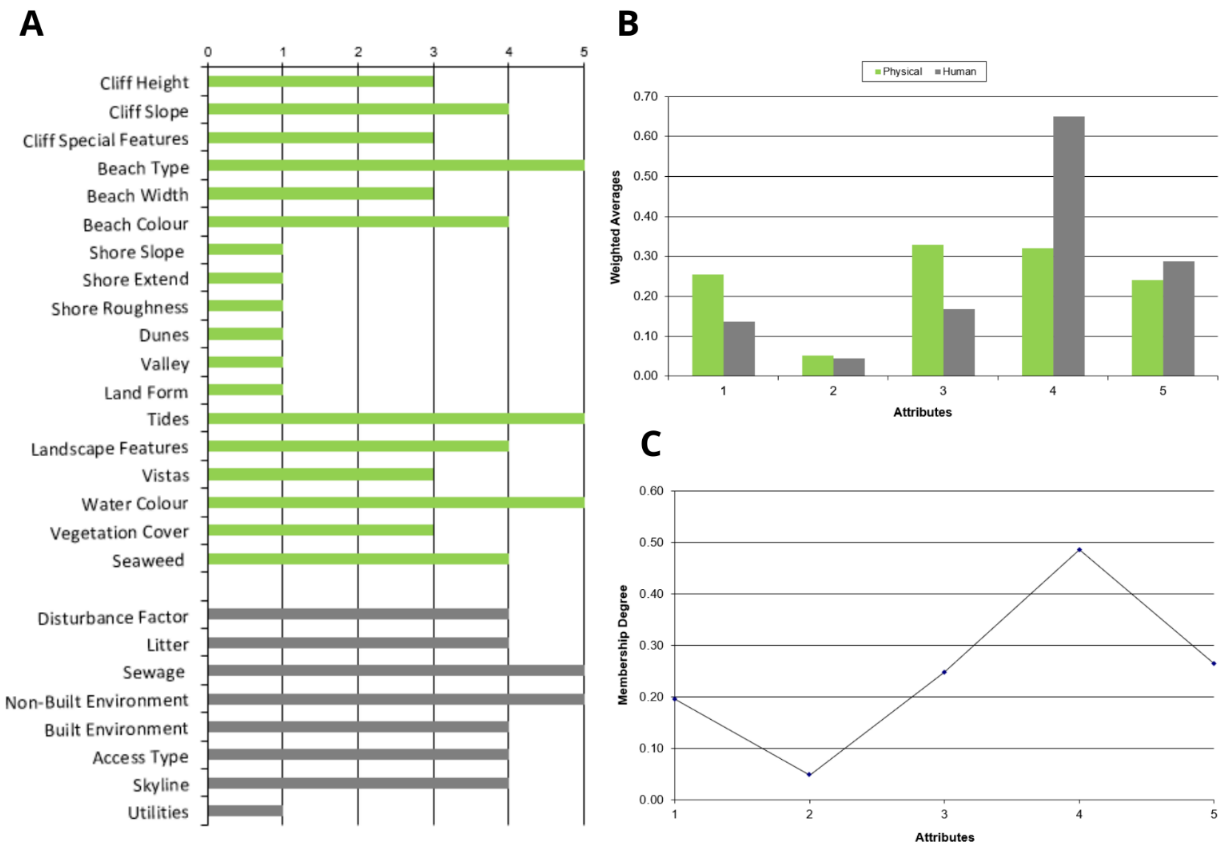

Figure 6. CSES parameters ratings for Cala d'Hort, Ibiza (D: 0.64; class III) (**A**), weighted averages vs. attributes (**B**) and membership degree vs. attributes (**C**).

(c) Class III

For locations with "D" ≥ 0.4 and <0.65, only 7 sites were classified, and all were observed in Ibiza and Mallorca. Despite the approach of this study that only focused on very attractive scenic sites, these beaches were chosen during the fieldwork since all of them present high natural values but are considerably affected by human activities. In many cases, judicious measures could be suggested to improve scenic values (cf next paragraph). Cala d'Hort, almost a class II site (D: 0.64), is an interesting case that adequately reflects the situation at many Ibiza beaches (e.g., Cala Comte or Cala Boix).

Good ratings were observed for physical parameters, i.e., beach type and color, turquoise water, cliff characteristics, and an excellent score for landscape features, especially the impressive view on Es Vedrà —an emblematic Ibiza islet with a height of 382 m—located very close to the coast (Figure 3C). However, lower scoring for anthropogenic aspects and particularly "utilities" seriously altered the scenic quality, i.e., sunbeds and beach umbrellas managed by beach restaurants, litter bins, a beach aid station and human settlements located on the beach (Figure 3C). "disturbance" and "litter" linked toeach users were noticed as well as "built-environment" and "skyline" related to nearest constructions, and "access type" because of a parking lot visible from the beach (all of them rated 4) (Figure 6A). Weighted averages, histograms, and attribute curves reflect such human influence on the scenery (Figure 6B,C).

5.1.2. Natural and Human General Sites Characteristics

Evaluation index scores "D" and scenic characteristics are presented in Figure 7 and Table A2. Sites are, respectively, located in Ibiza (11), Formentera (5), Mallorca (18) and Menorca (18). In total, 29 out of 52 belonged to class I (56%), 16 to class II (31%) and 7 to class III (13%) (CSES method). Menorca and Formentera showed the highest scores regarding scenic qualities with similar average "D" values (0.89 and 0.88, respectively), followed by Mallorca (D: 0.83) and Ibiza (0.77). Very attractive sites, such as Es Bot and Es Tancats in Menorca, Es Coll Baix and S'Arenal d'en Casat (Mallorca) (Figure 8A) or Aigües Blanques (Ibiza) stand out from the rest with high ratings for CSES parameters and "D" values >1.05. Other locations, e.g., Cala d'Hort, Cala Comte (Ibiza) or Portals Vells and Cala Agulla (Mallorca), showed poor scores for human parameters and were consequently included in class III (Figure 7 and Table A2).

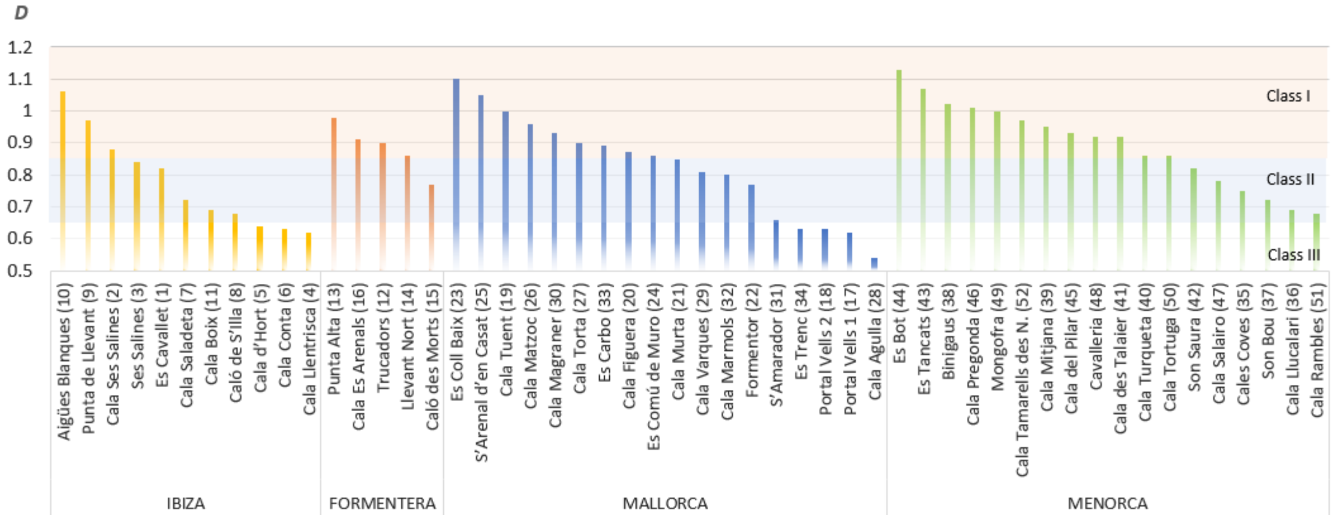

Figure 7. "D" values (CSES method) obtained at the 52 sites investigated in the Balearic Islands.

(a) Physical parameters

Excellent scores were often observed for water color, and many parameters were linked to the morphological characteristics, e.g., presence of beaches and dunes and the physiographic/geological setting of the islands that constitute an extension of the Betic Chain, e.g., presence of cliff, special landscape features and a very undulating and mountainous landform. For example, very high scores were observed at the northern coast of Mallorca, where the Sierra Tramuntana favors the formation of pocket beaches, such as Cala Figuera, Cala Murta or Cala Tuent (P. 12, rated 5). From the latter place, it is possible to observe the well-known Puig Major, the highest peak in the Balearic Islands, very closely (1436 m altitude) (Figure 8B). Undulating landforms are usually observed at Ibiza, and therefore, high scores were recorded there (e.g., at Es Cavallet, Ses Salines, Llentrisca, Punta de Llevant), while sites investigated at Formentera and Menorca presented lower scores, except at the northern coast of Ciutadella, i.e., Es Tancats, and Cala del Pilar. Coastal relief along the coast of Menorca, Ibiza and Mallorca also favored high scores for cliff parameters at several sites as Cala Llucalari (Figure 8D), Cala Llentrisca or Es Coll Baix, the latter enclosed by an impressive cliff up to 90 m in height (P.1, rated 5).

Good ratings for beach characteristics were observed at most of the sites since the Balearic Islands are predominantly composed of fine/medium to coarse carbonate bioclastic sand with spatial variation controlled by increasing contributions of quartz and lithoclasts along the northern coast of Menorca, Mallorca and Ibiza (e.g., Cala del Pilar, Figure 8C). Boulder and coarse gravels are also observed in these regions (e.g., Calas Tuent, Figuera and Murta in Mallorca or Caló de s'Illa in Ibiza). A curious case is Cala Boix (Ibiza), which shows a very noteworthy "dark" sandy system (Figure 8F). White or gold sandy beaches, mainly composed of marine biogenic carbonate originated from calcareous algae, bivalves, gastropods and bryozoans, among others [75,76], are very common at Formentera and at the southern coast of Mallorca, Menorca and Ibiza. At places, the presence fragments from foraminifer *Miniacina miniacea* rise to flashy pink colors along the beach shoreline (e.g., Es Bot, Menorca, Figure 8E). In these areas, several locations, such as Es Cavallet, Ses Salines, Truncadors, Es Trenc, Es Carbó, S'Arenals d'en Casat are surrounded by fixed and forested dunes (consisting of pines or junipers), which favor good ratings at parameters "10" and "17" (Figure 8A).

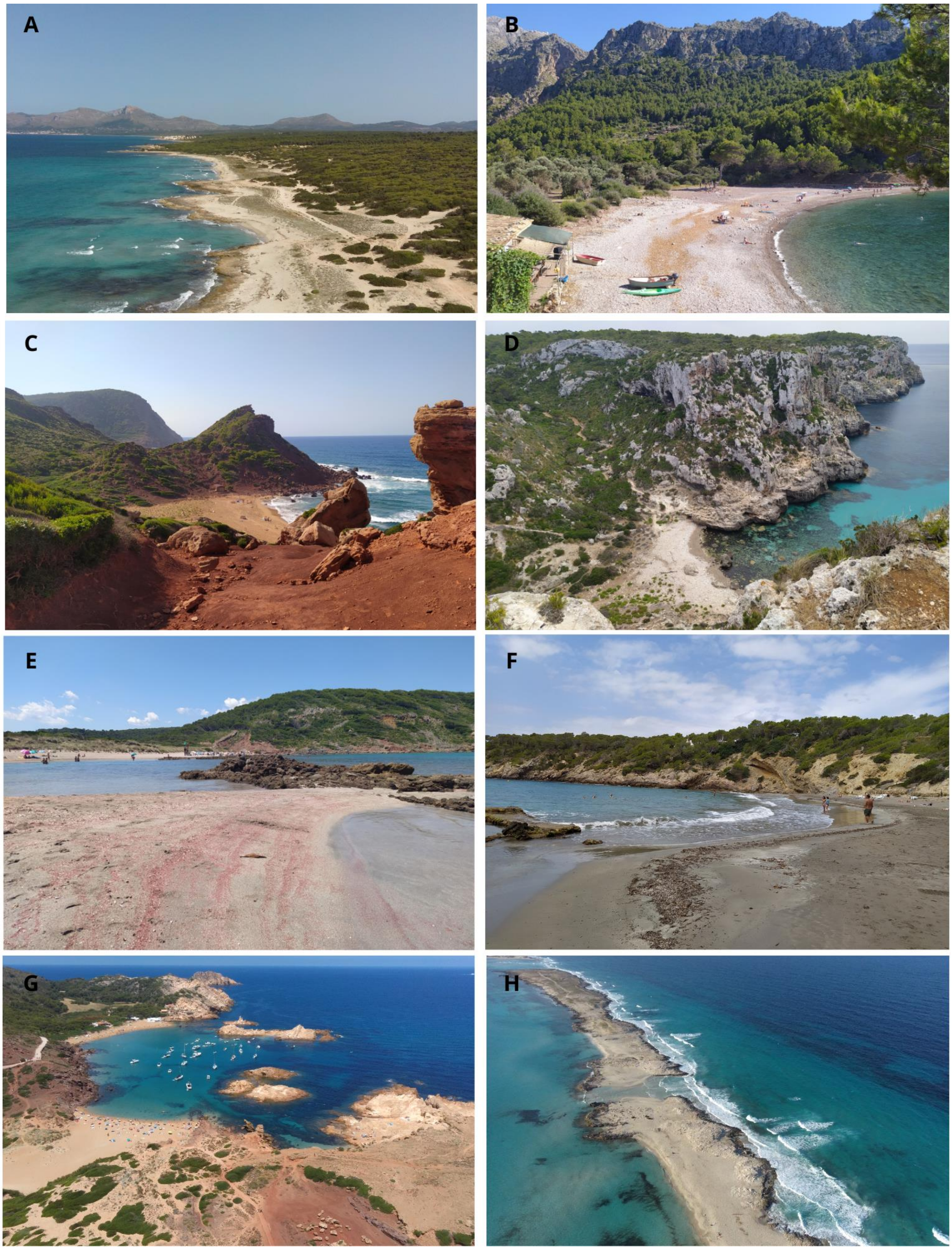

Figure 8. Natural scenic characteristics: fixed dunes and natural coastline of S'Arenal d'en Casat, Mallorca (**A**); mountainous landform at Cala Tuent (Puig-Major on the left), Mallorca (**B**); contrast of colors at Cala del Pilar, Menorca (**C**); cliff at Cala Llucalari, Menorca (**D**); sediment colors at Son Saura (Menorca) (**E**) and Cala Boix (Ibiza) (**F**); presence of reefs and islets at Calas Salairó and Pregonda, Menorca (**G**); narrow barrier island, Punta Alta, Formentera (**H**).

Crystal and turquoise clear water linked to the large abundance of *Posidonia oceanica* in the nearshore was observed at almost all sites (Table A2; Figure 8). It was also very usual to observe great amounts of *Posidonia oceanica* necromass (beach wrack or *banquettes*), mainly leaves and rhizomes, along the shoreline (P.18), providing in a pocket and semi-enclosed beaches protection effect against erosive processes [77]. This contribution is less important in exposed and more dynamic beaches [78].

Finally, the general coastal physiography/geology of the islands favor excellent scores at "landscape features" (P.14, Table A2), which make coastal scenery very attractive and diverse between islands, i.e., the presence of reefs and islets (Figure 8G), embayment, stacks, rocky ledges and barrier islands (Figure 8H) among others.

(b) Human parameters

A comparison of ratings obtained for human parameters at different islands is presented in Figure 9. Since this study is focused on the most attractive natural locations, sites usually show good scores, but some substantial differences between islands can be highlighted. Formentera and Menorca lead the ranking with, respectively, average scores of "4.78" and "4.76" followed by Mallorca (4.51) and Ibiza (4.43) (Figure 9). In general, parameters such as "sewage", "non-built", and "built environment," and "access type" present very high average values. Significant variances are observed for "utilities" and "litter" parameters and, to a less extend, at "skyline" and "disturbance factor". The discussion focuses on human parameter scores and on the establishment of feasible measures for their improvement.

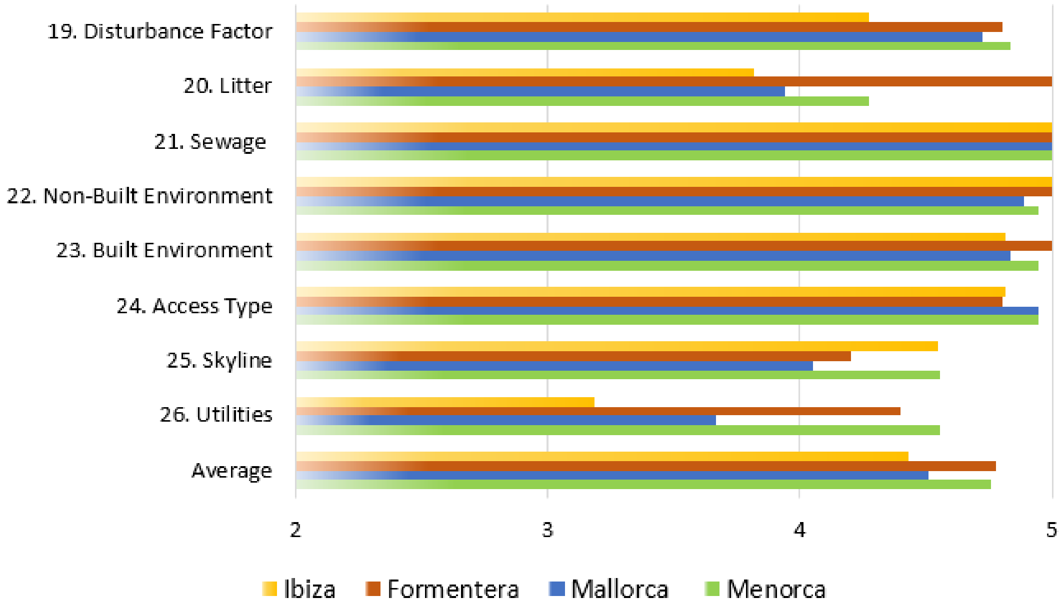

Figure 9. Comparison of human parameters values between islands.

5.1.3. Ratings Analysis and Suggestions for Scenic Enhancement

A beach like Formentor probably was, many years ago, before the emplacement of the resort, one of the top scenic sites in Mallorca and probably of the whole Balearic Islands. If human parameters, such as "built", "non-built environment," and "utilities" could be corrected (and rated 5) as well as physical aspects affected by human impacts revised, i.e., beach width (rated 5) and dune system (rated 4), the "D" value would be 1.22. Obviously, in this case, turning back the clock is not feasible since the human impact is virtually irreversible. Nevertheless, in other circumstances, "small" judicious interventions could be carried out to give considerable improvement.

Regarding natural parameters, it should be noted that a small number of changes can be made to improve them (e.g., formation of artificial dunes or beach nourishment), and, therefore, most relevant management efforts must focus on anthropogenic parameters (Figure 10). Scores obtained for each human parameter are discussed, and several suggestions for coastal managers and/or competent authorities are presented.

Figure 10. Examples of human scenic impacts: noise disturbance at Cala Comte, Ibiza (**A**); plastic litter stranded at Cala Llentrisca, Ibiza (**B**); the curious case of Cala Pregonda (**C**); conflicts between beach users and private coastal landowners at Cala Varques, Mallorca (**D**); skyline impact of buildings (background) at Son Bou, Menorca (**E**). Beach kiosk, suns beds, beach umbrellas and litter bins in S'Amarador, Mallorca (**F**).

"Noise disturbance" was usually low or non-existent, but at places, some disturbance was noticed due to the high numbers of beach users. Such was particularly the case in Ibiza where access is easy (e.g., Cala d'Hort); at Cala Comte bars where loud music produced higher disturbance (rated 3, Figure 10A). Disturbance tends to increase during the summer period when sites are inundated by visitors and vice versa in the low season. Finally, noise linked to the Ibiza airport was also observed along the southern coast of the Ses Salines Natural Park (rated 4; Ses Salines, Es Cavallets, Cala Ses Salines).

"Litter" was characterized by a few scatted items (rated 4) essentially attributed to beachgoers. A few remote sites, such Cala Llentrisca, continuous accumulations, especially of plastic items mainly stranded by currents and waves, considerably affected scenery (rated 1, Figure 10B). In this case, the absence of periodic cleaning operations is surely linked to the difficulty of access and the low interest of managers. Such was also the case of several remote sites in Andalusia where mechanical clean-ups were impossible [68,79,80]. However, if the current litter score (1) at Llentrisca is improved to obtain a rate of 4, the index "D" would jump from 0.62 to 0.84 and convert it to an almost class I (D > 0.85) site. Cala Llentrisca is one of the few beaches left in Ibiza located in a completely natural environment where only ancient fishermen's edifices still remain. Two sites in Menorca, respectively Cala Rambles (D: 0.68; class II) and Cala Salairó (D: 0.76; class II), show single litter accumulations (rated 3) that are certainly associated with recent storm events that occurred before field observations. If both sites had only a few scattered items (rated 4), the "D" value would respectively increase to 0.84 and 0.92, which upgrades Cala Salairó to class I and Cala Rambles to the upper limit of class II.

"Sewage evidence" was virtually absent, and "non-built environment" was constituted fundamentally by natural trees, forests, etc., allowing excellent scores, except at Formentor (rated 3). Another case was the Binigaus site (Menorca), rated 4, which presents a pasture field as well as a pine forest.

Regarding the "built environment", which obtained top rating in 86% of the sites, grouping essentially ranged according to beach typology and the visual impact of surrounding constructions, but some curious examples stand out from the rest. In Ibiza, places such as Cala d'Hort, Saladeta and Comte were rated 4 since they are located in rural and resort areas, and some buildings were visible from the beach. It was also the case for Portal Vells 1 in Mallorca because of a restaurant built very near to the shoreline. Sites, such as Calas Murta, Pregonda, Varques, Marmols in Mallorca or Pregonda in Menorca were backed by private farms and lands (*propiedad privada* in Spanish) and, at some places, surrounding buildings were visible, i.e., Cala Murta. Sometimes, conflicts related to access emerge between beachgoers and private owners. Such was the case of Cala Varques, where users do not accept making a long walk to access the beach (Figure 10D). Cala Pregonda is a very curious case, several constructions were located in the back dune or nearby hill, but one of them remains on the beach itself at 2 m from the shoreline (Figure 10C). However, beachgoers must walk around 2 km to access the beach. Another attractive case is Cales Coves, a prehistoric necropolis with over ninety hypogeums and natural burial caves above the cliff in Menorca (rated 5 as historical context).

"Access type" usually showed excellent scores. At only 4 places, the car parking was visible from the beach (rated 4) due to the absence of a buffer zone, i.e., Cala d'Hort and Cala Saladeta in Ibiza, Cala Es Arenals (Formentera) and Cala Tuent (Mallorca). Regulation of access is also fundamental to determine the number of visitors and avoid excessive tourism increase. Menorca is clearly a good example, since beaches are, on the whole, at a significant distance from road and car parking, while in Ibiza, most of the sites showed easy access. At Pregonda, "access type" was rated 4 since the private "road" access to residences was perceptible. Places such as Cala Boix or Cala Comte were rated 5 because parking areas were hidden by the cliff.

"Skyline" corresponds to human settlements silhouettes or profiles that are not in harmony with the coastal environment. Regarding the scores obtained, 50% of sites, mainly situated in Menorca, showed the top grade (5); 19 sites presented a skyline very sensitively designed (rated 4), e.g., Arenal d'en Casat and S'Amarador in Mallorca. At some places, it was also linked to the high presence of recreational and sailing boats, e.g., Es Carbo (Mallorca) or Cales Coves (Menorca). Many sites obtained a rating of 3, e.g., S'Amarador, Es Comú de Muro or Es Trenc since they were located at natural park borders. The worst score (2) obtained corresponded to Son Bou, located in southern Menorca. In the 1970s, a resort complex, built along the coastline and rising up to 2 giant buildings (11 plants), completely altered the coastal landscape harmony, as shown in Figure 10E. Today, the emplacement of buildings still remains highly controversial. If buildings were not present at Son Bou (D: 0.72; class II), the site would have a "D" value of 0.96 (class I).

"Utilities" include seawalls, pipelines, street lamps, revetments, etc. Nonetheless, scores obtained at sites were essentially linked to temporary leisure facilities devoted to seasonal use. At many places, conflict of interest arises between the providing of such services and the preservation of natural scenic beauty. The presence of such leisure facilities is regulated by the regional environment council (*Orden 06/2013 del Consejero de Agricultura, Medio Ambiente y Territorio* in Spanish), which establishes the common guidelines and the general coastal regulation (*Reglamento General de Costal por Real Decreto 876/2014*). The latter, through the Art. 68, restricts the occupancy by beach facilities to 10% of the total surface for natural beaches, while, for urban ones, the limit is fixed at 45%. For sites located in protected areas with a specific management plan, the allowed beach occupancy also depends on management directives and zoning policies established by PORN and PRUG. Given this context, substantial differences can be observed among sites located in different kinds of protected areas and in different islands. In Ibiza, 3 sites showed > 3 typologies of "utilities" (rated 1), i.e., Cala d'Hort, Cala Comte and Cala Boix. Such was also the case for Portal Vells 1, Cala Agulla and S'Amarador in Mallorca (Figure 10F). Another interesting case was Ses Salines, located in a natural park, but scored "2", linked to very permissive regulations. Sites located in Ses Salines Natural Park in Formentera (e.g., Punta Alta or Llevant Nort) showed good ratings. Contrarily, all sites in Menorca (apart from Cala Pregonda, rated 3) gave a rating of $\geq$4. If the utilities visual impact at Ses Salines (D: 0.84; class II), constituted by beach restaurants, sunbed, beach umbrella and an aid station, were improved to rate 3, the "D" value would be "0.93", and the site would be upgraded to class I. If more restrictive directives are applied (and facility rated 4), Ses Salines will be one of the most attractive sites of the Balearic Islands (D: 1.06). Another beach situated in a natural park with low scores at "utilities" (1) was S'Amarador in Mallorca (D: 0.66), where were observed a beach kiosk, beach umbrella associated with sunbeds and very evident litter bins. At Es Trenc (Mallorca, D: 0.63; rated 3), an upgrade to rate 4 (D: 0.76) could be achieved by removing the beach kiosk. At many places, beach aid stations are essential because of rip currents (e.g., Es Comú de Muro in Mallorca; rated 4), but it is interesting to highlight how certain places provide leisure facilities without altering the scenic quality. For example, in Llevant Nort (Formentera), the beach bar and bins are located in the back dune at the beach access. Only a first aid station remains on the beach (rated 4).

Finally, it is remarkable the manner in which several sites in Menorca, and particularly on the northern coast, have been managed in the last decades since the island still preserve a high diversity of pristine natural landscapes, with top scores at human parameters, in spite of the global and increasing human pressure that recorded in coastal Mediterranean islands [66,81].

5.2. Coastal Scenic Sensitivity

5.2.1. Scenic Sensitivity to Natural Processes

In a first step, sites were included in one of the three categories according to their physical characteristics [17]. Only a very attractive site in Ibiza, i.e., Punta de Llevant (also known as Moon Beach), was constituted by a large rocky shore platform and, therefore, considered as not sensitive and ranked in category I, i.e., no further investigation was required for this site. Places with "beach face" but no "dune" parameters belonged to category II (23 sites; e.g., Cala Llentrisca o Cala Magraner), while sites showing both parameters were included in category III (28), e.g., Ses Salines or Es Bot. Sites scores obtained at natural parameters are presented in Table A3.

In a second step, an Erodibility index was calculated for sites belonging to categories II and III by analyzing physical characteristics related to "beach face" and "dune" parameters (Table 2). All variables were assessed during field observations except for the parameter "dry beach as a multiple of the imminent collapse zone" (Table A3), valued using orthophotos for the period 1984–2018 [82]. More than 40% of sites (22) showed high erosion rates producing extensive loss of beach width (rated $\geq$4). For example, in Menorca, places such Binigaus, Cala des Tailaiers and Binigaus lost around 10 m of width, while Es Trenc, located in Mallorca, lost more than 11 m during the investigated interval; other places as Es Cavallet (Ibiza), Es Coll Baix, Cala Varques or Es Carbo in Mallorca presented accretion rates (rated 1).

At "sediment grain size" (Table A3), beaches composed of gravel, pebbles or boulders obtained the lowest score (1), e.g., Cala Llentrisca (Ibiza), Calas Figuera and Murta (Mallorca) or Cala Llucalari (Menorca). Several sites obtained medium values (3) since they were constituted of mixed sediment (e.g., Cala Tortuga, Menorca) and/or presented significant seagrass accumulations composed by Posidonia, i.e., at Cala Matzoc and Es Carbo in Mallorca, Cales Coves, Son Saura, Calas Rambles and Tamarells des Nords in Menorca. Sites showing minor Posidonia beach wracks were rated 4 (e.g., Es Cavallet, Caló des Mort or Es Trenc). Fine sandy beaches, very common in the Balearic Islands, obtained the highest score (5). Regarding "rocky shore", few investigated sites showed very extensive foreshore and/or emerged platforms—the most relevant case was Punta de Llevant at the northern coast of Ibiza included in category I. Several places obtained intermediate values, such as Cala Pregonda and Salairó in Menorca, linked to the presence of islets, reefs and nearshore platforms that increased resilience to erosion processes dissipating wave energy; other cases were found at Trucadors in Formentera or Cala Ses Salines in Ibiza. Within the "dunes" parameter (Tables 2 and A3), dune height, width, vegetation cover and washovers were assessed for category III sites. Some places as Ses Salines (Ibiza), Es Comú de Muro, S'Arenal d'en Casat, Es Carbo (Mallorca) or Mongofra (Menorca) were protected by very developed dune systems, highly resilient to possible high-energy events, which gave very low values for each one of the considered parameters. At places, dune ridge continuity was interrupted by washover fans forming sensitive spots to coastal erosion and flooding processes, e.g., Cala Agulla, S'Amarador, Binigaus (rated 3) or Mitjana (rated 4). Dunes showing high values at the four parameters usually corresponded to a foredune system (e.g., Turqueta). It is well-known that recreational use has a negative impact on coastal dunes [83]. For this purpose, numerous sites were managed by the implementation of conservation measures preventing visitor impacts by the provision of walkways (Agulla), signage (Es Cavallet, Es Comú de Muro), barriers (e.g., Es Cavallet, S'Amarador, Es Trenc) or stabilizing bare sand by planting vegetation (Llevant Nort). If a place such as Llevant Nort, in Formentera (NSI: 0.67; group III), improves dunes parameters to rate 1 (currently it is rated 2), the NSI index will upgrade to group II (0.61). In the case of Es Trenc (NSI: 0.66; group III), if actual barriers emplaced to increase dune width and reduce the formation of washovers are used, the site will be upgraded to group II (0.63).

In a third step, a "correction factor" based on forcing variables and future trends related to climate change was calculated for each site. Data of "significant wave height" (H_s) and "angle of approach" were obtained from the official website of *Puertos del Estado* (Ports of the State in English) [84]. Scores and average values presented for both parameters were exclusively assessed during the Northern Hemisphere winter period, i.e., from October to February, as defined by Taguchi [85]. In general, the islands of Ibiza, Formentera and Mallorca showed low ratings at H_s, with values <1.5 m (<3), and sites located in the southern coasts were usually the less sensitive, e.g., Caló des Mort (0.77; rated 1) or Son Bou and Binigaus (0.74; rated 1). The highest values registered by virtual buoys were observed along the northern coast of Menorca with waves approaching from the northern quadrant, i.e., Es Tancats, Es Bot, Cala del Pilar (average 1.53 m) and Cavalleria (1.51 m). The most exposed site was Cala del Pilar since its coastline was completely parallel to the wave approach direction and H_s > 1.5 m (rated 5 at both parameters). All sites obtained 5 at "tidal range" since a micro-tidal coastline is always near high tide and, therefore, always at the greatest risk of significant storm impact [86–89].

Regarding the "sea-level rise" parameter (Table 2), its calculation depends on the future projections of sea-level position that are often strongly linked to regional factors, such as the tectonic trend of the area. Studies, such as Vesica et al. [90] and Benjamin et al. [91], which reviewed key data on relative sea-level changes in the Mediterranean Basin, highlighted that the elevation of the marine isotopic stage (MIS) 5.5 Relative Sea-Level indicators for the Balearic Islands is constrained between +2 and +3 m and, therefore, the Balearic Islands could be considered as tectonically "stable". Results obtained from the coastal Flood Adaptation plan of the Balearic Islands [82] and Enriquez et al. [92] confirmed that regional SLR is expected to reach around 50 $\pm$ 25 cm and 70 $\pm$ 35 cm under the Representative Concentration Pathway (RCP) 4.5 and RCP8.5 scenarios by 2100. The first scenario, RCP4.5, corresponds to an optimistic emission scenario where emissions start declining beyond 2040, while RCP8.5 is a pessimistic scenario where emissions continue to rise throughout the century [26]. Based on these data, a value of 5 was assigned to all the investigated sites. Further, the areas investigated are not recording ongoing natural and anthropogenic subsidence processes [93].

Concerning "storm surge" (SS), an exhaustive review of existing papers and reports was carried out to assess trends at the European scale under different climate scenarios and to consider different return periods. Among others, the Copernicus climate change service (C3S) has released a dataset of sea-level indicators for the European coast covering the period from 1977 to 2100. The evaluation of these indicators is based on the analysis from past observational data and future climate projections. According to the projections of the SS indicator (defined as the difference between the pure tide and the total water level simulations), the following mean values were obtained for each island considering the 2100 scenario, i.e., 0.61 m at Ibiza, 0.60 at Formentera, 0.65 at Mallorca and 0.68 at Menorca. All the islands consequently obtained the lowest rating at this parameter (i.e., 1). The whole dataset of indicators can be freely downloaded from the Copernicus Data Store platform [94].

Once calculated the EI and the CF value, a sensitivity index to natural processes (NSI) was obtained for each site and presented in Figure 11.

Thereafter, sites were classified into one of the three sensitive groups. Except for Punta de Llevant (category I), none belonged to group I. Most areas shown values ranging from 0.33 to 0.66 and, therefore, fell into group II (36 sites). Fifteen locations were considered as highly sensitive to natural processes falling within group III (NSI$\geq$0.66), and 2 sites clearly stand out from the rest, i.e., Cala d'Hort (NSI: 0.91) and Formentor (0.89), showing top ratings at EI parameters: dry beach < ICZ (5), fine sand (5) and no presence of a shore platform (5). During the interval investigated (1984–2018), Cala d'Hort lost around 3.3 m for an average beach of 17.5 m, while Formentor observed a net loss of 2.8 m and a 9 m beach width. Except for artificial beach nourishment, very few sustainable measures could be carried out by managers to increase site resilience since both places do not present a buffer zone separating the beach from human settlements.

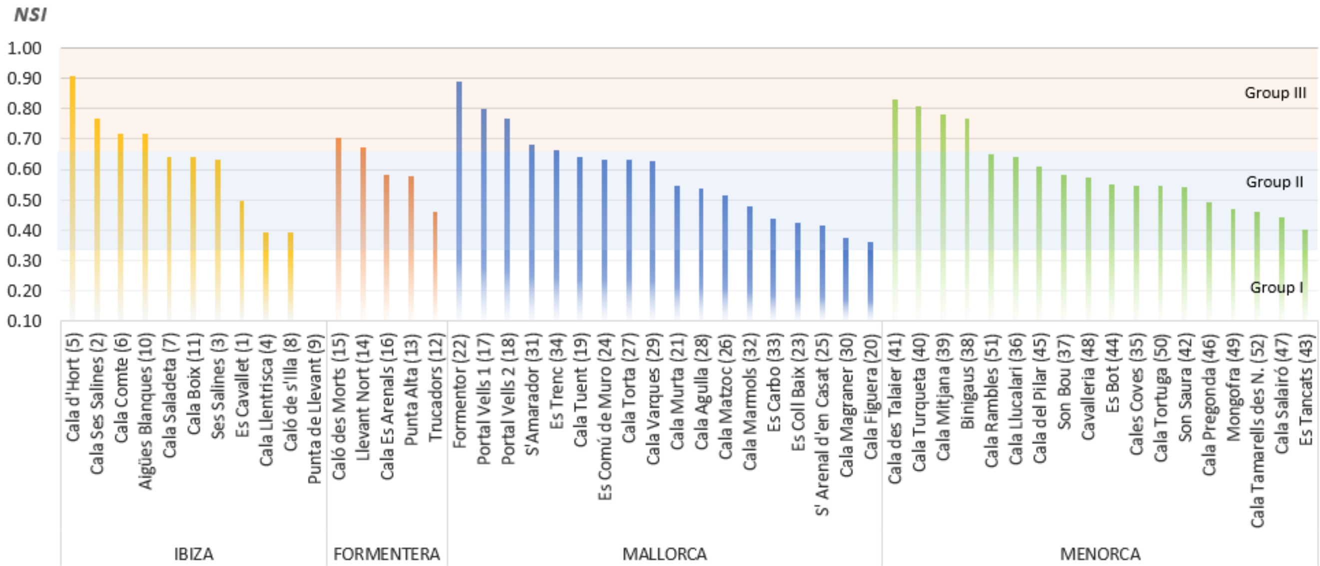

Figure 11. NSI value obtained at the 52 sites investigated in the Balearic Islands (CSSI method).

Further, cases observed at Menorca are quite noteworthy. Despite the fact that forcing variables showed the highest value along the northern coast, the most sensitive sites were observed in the southern island (i.e., Calas Turqueta, des Talaier, Mitjana and Binigaus; group III). This fact is probably linked to the present-day management strategies related to the cleaning operations and, more particularly, to the removal of Posidonia beach wrack. Hence, the current cleaning plan, established by Insular and city councils of Menorca in line with the declaration of the island as a biosphere reserve, divided the 136 Menorcan beaches into three types: "A" urban beaches (30 units); "B" unspoiled beach coved by good access, not too far from a road (29); and "C" as the rest of beaches, far away from public gaze and rarely frequented. The method used for the cleaning system and the management of Posidonia wrack depends on the beach type. A manual collection system, the least aggressive method, is usually used for litter in beach-type "B", but the mechanical operation to remove *P. oceanica* wrack is carried out at the beginning of the high season. Concerning beach type "C", *P. oceanica* is not removed, and only manual cleaning is carried out for beach litter using boats to access sites. The interesting point is that the northern beaches investigated in this study belonged to type "C" (except for Pregonda, "B"), while most of the sites located in southern Menorca, including remote areas, were included in Type "B".

The sound management of *P. oceanica* beach wrack clearly constitutes a challenge for coastal municipalities since the different stakeholders and particularly the visitors usually have a negative perception of such accumulations [77,95]. It would be judicious to try to upgrade such sites to type "C" since they are the most sensitive sites located on the southern coast, e.g., Calas Turqueta, des Talaier, Mitjana and Binigaus, and, therefore, maintain Posidonia wracks on the beach to reduce erosion rates.

5.2.2. Scenic Sensitivity to Human Pressure

According to their location and CSES ratings for anthropogenic parameters, sites were cataloged in a first step, within the human categories sections of I (2 sites), II (39) and III (11). Mooser et al. [17] defined category I as places with null human disturbance, located in very natural and isolated areas and/or places under a strong protection feature, with top scores for all human parameters. Such was the case for Cala Figuera in Mallorca, situated in the Natural Place Sierra Tramuntana (also a World Heritage Site, Natura 2000 SAC and nature reserve) accessible by a > 50 min walk from the nearest car park. Another case was Mongofra, located in the S'Albufera des Grau Natural Park, core area (zoning 1) of the biosphere reserve in Menorca, and accessible by a >1 h walk. No further investigation regarding their sensitivity was required.

Investigated sites generally belonged to category II, described as places with low human impacts essentially linked to “noise disturbance”, “litter”, “sewage discharge evidence”, and showing temporally emplaced facilities as litter bins, beach umbrella, sun loungers (“utilities”, points 19–21, 26, Table 1). Such sites were generally located in natural places under protection features and impacts were related to human affluence during tourist season, e.g., Cala Torta (Mallorca), which showed top ratings for human parameters except for “litter” (4) and “utilities” (3); or Caló d’Es Mort (Formentera), a very small and attractive pocket beach, highly frequented in the peak season (reflected by the “noise disturbance” parameter), since it is located at a 10 min walk from a resort complex. Another example is Cala Rambles in Menorca, located in a fully natural environment (natural park and biosphere reserve, zoning 1), but not included in category I because of several accumulations of litter that considerably affected scenic quality.

Finally, category III sites presented medium scores at human parameters mainly related to land use and beach typology (which affects “built environment” or “skyline”, among others) and low or no protection features (or located at the border of protected areas), e.g., Portal Vells 1 or Cala Agulla in Mallorca. Site scores obtained at human sensitivity parameters are presented in Table A4, and their analysis is given in the following lines.

Concerning the human impact index (HI) calculation, “access difficulty” and “beach typology” were assessed during field visits (the latter only for category III sites). Almost 80% of the investigated sites required at least a 10 min walk (rated >3), and 25% were accessible by a >45 minutes’ walk or by sea (rated 1). In Menorca, 10 out of the 18 sites obtained scores 1 and 2 (>25 min) and only one place was scored >3 (Es Tancats, rated 4), while, in Ibiza, easier accessibility was commonly observed, with 3 sites reached by a <5 minutes’ walk (rated 5, i.e., Calas Comte, Boix and Hort). Regarding “beach typology”, all sites included in category I and II were located in remote or rural areas, while category III sites were, respectively located in rural areas (6 sites) (e.g., Ses Salines, Calas Saladeta and Tuent), Village (3) (e.g., Portal Vells 1) and resort areas (2), i.e., Formentor and Cala Boix.

With respect to the “protected area management category” established by the International Union for Conservation of Nature (IUCN), sites belonged to a great range of areas, from very strict to permissive categories (i.e., Ia to VI, Table A4). Certain spatial areas were totally (or partially) covered by several designation types applied at regional to international levels, but sites generally obtained a score of “3”, corresponding to IV-VI UICN categories. Seven places rated 2 since located within strict natural Protected Areas, respectively at Serra Tramuntana, World Heritage Site (e.g., Cala Figuera), and at S’Albufera des Grau Natural Park in Menorca, a core area of a biosphere reserve (e.g., Cala Tamarells des Nord). Places located exclusively under an ANEI or ARIP designations type, such as Aigües Blanques in Ibiza, were scored 4, whereas Formentor, previously described, obtained the highest value (5).

Data obtained from IBESTAT [61] allowed the parameters “tourist intensity rate” (TIR) and “population density” (PD) to be assessed at a micro-scale (NUTS 5 or coastal municipality) since regional or insular averages bear the risk of misleading disparities between coastal areas. High values ($\geq$4) of the TIR, defined as tourist beds per 1000 inhabitants, were regularly registered in the four islands, except in Mahón (70 beds per 1000 inhabitants; rated 1) and Ferreries in Menorca (235 beds; rated 2) as well as Campos (77 beds) and Escorca (47 beds), both rated 1 and located in Mallorca. The highest values were recorded at Mallorcan towns, where tourist capacity is quite superior to the permanent population, e.g., Muro (2390 beds per 1000 inhabitants), Capdepera (1650 beds) or Alcudia (1380 beds), among others. Regarding PD, Ibiza showed the highest average rates (258 persons/km^2), followed by Mallorca (247 persons/km^2), Formentera (147/km^2) and Menorca (134 persons/km^2) [61]. Investigated municipalities usually showed scores $\leq$ of 3, but substantial differences were observed between some areas from very low (1) to high rating (4). This was especially the case of Mallorca, for which the lowest rates corresponded to

Escorca (1.5 persons/km^2), a small town located on the northern coast of Serra Tramuntana, while places, such as Calvia, on the western coast, counted with about 350 persons per km^2 (rated 4).

Afterward, a "correction factor" (CF) related to the evolution of beds in tourist establishments (between 2004 and 2019) was calculated for each investigated municipality. Even if scores varied from 1 to 5, most of the places showed values $\leq$ of 3, revealing global stability in tourist capacity. The lowest rate was observed at Arta in Mallorca, which recorded a 24% decrease of beds (782 in 2004, 582 in 2019), while the municipality of Campos, corresponding to Es Trenc (Mallorca), almost quadrupled beds numbers in the last 15 years period (from 228 to 834; rated 5).

Finally, combining the HI with the CF, a human sensitivity index (HSI) was obtained and presented in Figure 12.

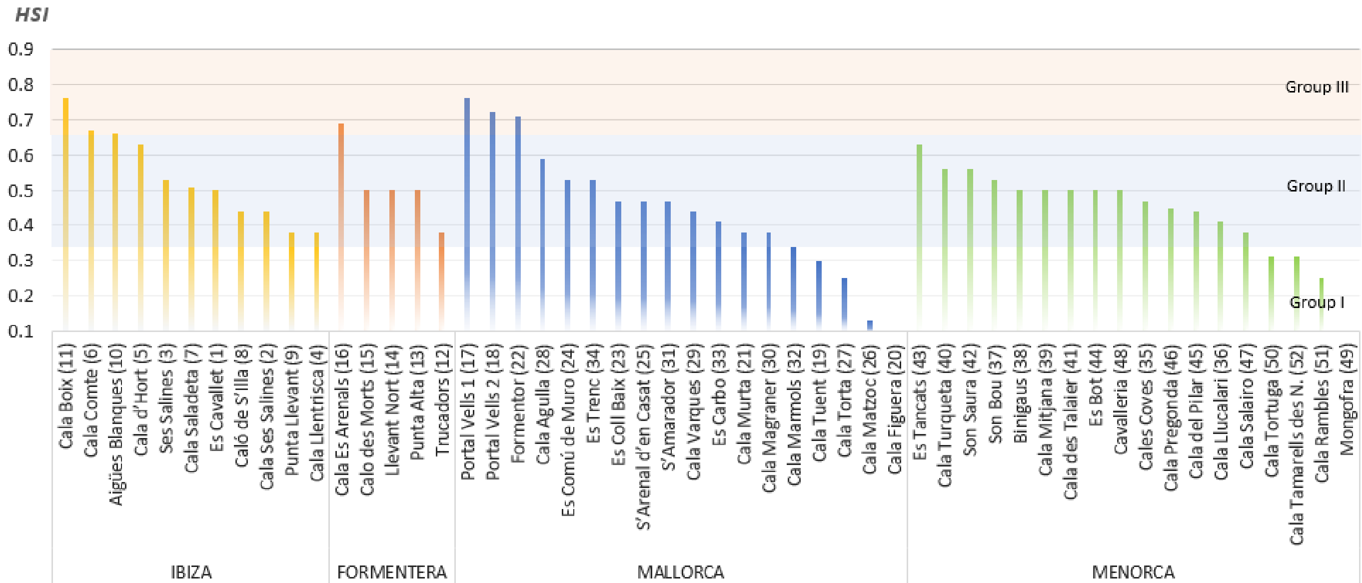

Figure 12. HSI value obtained at the 52 Balearic sites (CSSI method).

Sites were classified among one of the 3 sensitive scenic groups accordingly to their index values. A total of 8 sites were included in group I (HIS < 0.33), distributed between Mallorca and Menorca, 37 sites in group II (0.33 $\leq$ HIS < 0.66) and 7 in group III (HIS $\geq$ 0.66). Sites within group III, the most sensitive one, usually belonged to class II and III (CSES, method), i.e., Cala Boix (D: 0.69; class II), Cala Comte (0.63; class III) in Ibiza, Portal Vells 1 and 2 (respectively 0.62 and 0.63; class III) and Formentor (0.77; class II) in Mallorca. A decrease in the sensitivity (linked to human pressure) of these sites is quite hard to do from a management viewpoint since they are located in resort or village environments. Only Cala Es Arenals, a pocket beach situated along the southwestern coast of Formentera (also known as Cala Pirata), belonged to scenic class I (D: 0.91) and group III (HSI: 0.69), due to very easy access (<5 min from parking; rated 5), a low protection feature (ANEI; rated 4) and a high score (4) for the TIR parameter. If access required at least a 10 min walk, the HSI value would upgrade to "0.56" (group II) and if the PAMC is also upgraded to attribute 3, this site would obtain a score of 0.50. No group III sites arose at Menorca, and sites usually showed lower scores in relation to other islands. A unique place that showed high sensitivity to human pressure was Es Tancats (HSI: 0.63), mainly due to the access facility (rated 4). It is interesting to highlight that Es Tancats is one of the most attractive places in this study (D: 1.07; class I), and it should merit the attention of local managers that must avoid a further increase of pressure on the site. Further, if a value of 3 is obtained for beach facilities, the site sensibility will be reduced to 0.56.

5.2.3. Total Sensitivity (TSI) and CSSI Versus CSES

By combining the values obtained at NSI and HSI, a total sensitivity index (TSI) was calculated for each site according to the standard established in Mooser et al. [17]. Only 3 sites belonged to group I (TSI < 0.33), i.e., Punta de Llevant (0.19), Cala Figuera (0.18) and Mongofra (0.24). Most sites were included in group II (40), and 9 places were comprised in group III, principally located in Ibiza (4). Among the group III sites, 4 stood out from the rest with values >0.75: Cala d'Hort (0.77), Portal Vells 1 and 2 (0.78 and 0.75) and Formentor (0.80). Scores obtained for TSI are presented in Table 4, and analysis of the relation between *SI* and "D" value (CSES) is provided in Figure 13 with the purpose of making results easier to read and interpret.

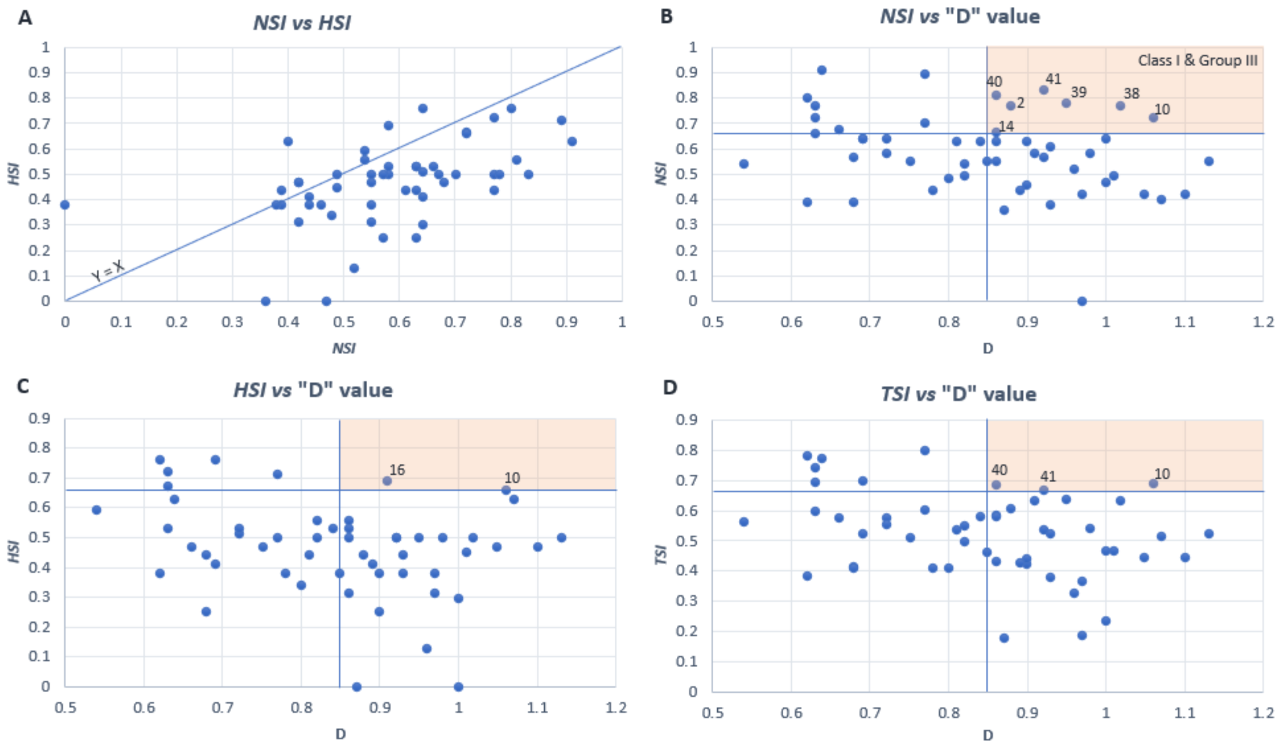

Figure 13. Natural SI versus human SI (**A**), NSI versus "D" value (CSES) (**B**), HSI versus "D" value (**C**) and TSI versus "D" value (**D**). Limits were determined in relation to class I (D ≥ 0.85, CSES) and group III (SI ≥ 0.66, CSSI) and numbers established according to the location map.

Values obtained for *NSI* and HIS are compared in Figure 13A. The scenery of investigated sites was considerably more sensitive to natural impacts than human pressure. The relation between scenic sensitivity and coastal scenic beauty was further analyzed and presented in Figure 13B–D) with the aim of determining priorities in terms of policies and management. For this purpose, sites belonging to class I (CSES) and group III (CSSI) were highlighted and identified as a priority. Regarding the NSI vs "D" values, 7 sites drew attention from the rest: Llevant Nort, Formentera (point 14), Cala Ses Salines (2) and Aigües Blanques, Ibiza (10), Binigaus (38), Cala Mitjana (39), Turqueta (40) and Cala des Talaier (41) in the southern Menorca. Concerning HSI vs. "D" value, 2 sites were considered as a priority, i.e., Cala es Arenals in Formentera (16) and, once again, Aigües Blanques (10). Finally, 3 very attractive sites showed high sensitivity to natural and human issues, i.e., Cala Turqueta (40), Cala des Talaier (41) and Aigües Blanques (10), and should require specific and careful attention from local managers and competent authorities.

Aigües Blanques is an attractive white sandy site surrounded by turquoise water and backed by a 30–40 m high cliff that divides the beach into two parts: a fully natural one and a recreation one (with leisure facilities). For natural sensitive parameters, the site obtained high scores for "sediment grain size", no "rocky shore" and intermediate values at "significant wave height" (0.75–1.5 m) and "angle of approach" (subparallel to the frontline) (Table A3). High sensitivity was also registered for human parameters linked to easy access (5–10 minutes' walk; rated 4), a low protection feature (border of ANEI; rated 4), and elevated rates at TIR and PD indicators (both rated 4). It could be interesting to regulate the access, control beach carrying capacity, and increase the level of protection since it is the most attractive site of this study in Ibiza. Regarding the Menorcan cases and their critical situation at natural parameters, values obtained for the "dry beach as a multiple of the ICZ" parameter stood out from the rest with total erosion rates > 10 m during the interval 1984–2018 (rated 5). As previously stated, it would be sound to leave Posidonia wracks on the beach at these sites as a way to increase their resilience to erosion processes.

6. Conclusions

The beautiful coastal scenery is a vital component of the 3S tourism that drives the economy of many coastal countries—this is even truer in the context of islands. Many countries or regions, among them the Balearic Islands, commonly reflect the scenic component in advertising the beauty of such places as perfect tourist destinations. However, their conservation has often been threatened in the last decades by economic developments because of the inexorable growth in population levels and tourism demand and its growing impact on natural processes. Beach management is a complex process that demands a holistic view since beaches display a wide variety of functions (coastal defense, recreation, conservation, etc.). However, beaches should not and cannot be compared as a whole, but rather considered according to their respective typologies. For example, in natural areas, beachgoers tend to consider scenic quality over everything else (e.g., safety, facilities, access, etc.). Coastal scenery has become a natural and an economic resource to be challenged, and scenic evaluation constitutes a mandatory issue as it provides a practical basis for coastal managers to establish sound management strategies for reaching long-term goals. Landscape beauty is not a renewable resource.

The coastal scenic assessment presented in this paper and carried out in the Balearic Islands was focused on two major issues: beauty and sensitivity. In total, 52 sites, located in Ibiza (11), Formentera (5), Mallorca (18) and Menorca (18), were field-tested under normal weather conditions. In a first step, scenic beauty was quantified using the well-known coastal scenic evaluation system (CSES) method, using a checklist of 26 physical and anthropic components, parameter weighting matrices and fuzzy logic. Through the evaluation index obtained (D), investigated sites were divided into classes I, II and III. In a second step, sites sensitivity to natural processes and human pressure were assessed by adopting a novelty method based on the calculation of three coastal scenic sensitivity indexes (CSSI): a natural sensitivity index (NSI), a human sensitivity index (I) and a total sensitivity index (TSI). As a result of the combination of the two previous indexes, sites were classified into three sensitive groups.

The Balearic Islands exhibit a wide variety of coastal scenes from extensive sandy coastlines (e.g., Son Bou) to rocky pocket beaches (e.g., Cala Figuera), dark sand (e.g., Cala Boix) and white sandy beaches (e.g., Punta Alta), vast plains (e.g., Formentera) to very undulating or mountainous landforms (e.g., Sierra de Tramuntana), or very developed dune systems (e.g., Mongofra) or high vertical cliffs (e.g., Es Coll Baix), just to name a few cases. In total, 56% of sites were comprised in scenic class I, defined as extremely attractive natural sites (CSES), 31% in class II and 13% in class III. Menorca and Formentera showed the greatest scores for scenic beauty due to low scoring for anthropogenic parameters and excellent value for physical parameters. Results obtained at Mallorca and Ibiza were more contrasted since the scenery was usually more affected by human impacts, especially at Ibiza. Indeed, beaches at such islands commonly showed lower rates at "utilities" mainly linked to temporary leisure facilities and, to a lesser, at "built environment", "skyline" and "noise disturbance" due to surrounding buildings and a high frequency of beach users.

Regarding scenic sensitivity, sites were more sensitive to environmental impacts than human pressure. Locations without a buffer zone, such as Formentor (Mallorca) and Cala d'Hort (Ibiza), were considered as the most sensitive investigated areas. Several beaches located on the southern coast of Menorca also showed very high sensitivity to natural events. Concerning human pressure, the most sensitive areas were registered in Ibiza and Mallorca, where easy beach access was frequently observed as well as a lower level of protection at some places (e.g., Aigües Blanques), together with high values at the tourism intensity rate and population density indicators. In most cases, the management model implemented at Menorca, relating to human issues, is clearly a good example since human activity impacts were generally low and pristine scenery still remained. Finally, scores obtained at CSSI were combined with values acquired at CSES with the purpose of identifying priorities in terms of policies and management.

This paper presents a complete overview of the most attractive coastal scenery at the Balearic Islands and provides a comparison between islands. Several judicious interventions were proposed to maintain or enhance scenic quality reducing human scenic impact when possible. It must be remembered that the Balearic Islands constitute one the most visited European tourist destinations receiving every year around 13.6 million visitors, and beaches represent a flagship product of this market. From a scenic point of view, it should be mandatory to maintain the natural character of the remaining undeveloped coastal sites to avoid irreversible damages and keep promoting diversification of activities under an ecotourism perspective, as it is done at Menorca. Results obtained represent a baseline to establish a coastal Heritage award to maintain the preservation of existing and already protected pristine sites of great scenic beauty and/or to enhance the knowledge of new attractive sites, always keeping in mind the importance of their protection and development under the umbrella of sustainable tourism. It also represents a mandatory tool for local coastal managers to identify priorities in terms of management, prevent/limit environmental degradation and anticipate growth scenarios of human pressure and, therefore, increase sites' scenic resilience. Lastly, it would be interesting to reproduce this novelty approach in undeveloped coastal countries/regions of great scenic relevance since pristine landscapes are globally turning into emerging tourist destinations. As said by Benjamin Franklin, "An ounce of prevention is worth a pound of cure".

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Appendix A

Table A1. Equations used for the assessment of EI, NSI, HI, HSI, TSI and correction factors (natural and human) (CSSI method).

Indexes and Categories	Equations	Parameters
Erodibility index (1) for category II sites (EI_{C2})	$EI_{C2} = E_{BF} = \frac{\frac{Pn_1+Pn_2+\frac{Pn_{3a}+Pn_{3b}}{2}}{n_{Pn}}-1}{A-1}$	E_{BF}: erodibility of beach face parameters Pn: natural parameter Pn_1: dry beach evolution Pn_2: sediment grain size Pn_{3a}: rocky shore width Pn_{3b}: rocky shore location n_{Pn}: number of natural parameters (3) A: maximum attribute value (5)
Erodibility index (2) for category III sites (EI_{C3})	$EI_{C3} = EI_{BF} \times \frac{2}{3} + E_{DS} \times \frac{1}{3}$	E_{DS}: erodibility of dune system parameters
Erodibility of dune system (3) (E_{DS})	$E_{DS} = \frac{\frac{Pn_4+Pn_5+Pn_6+Pn_7}{n_{Pn}}-1}{A-1}$	Pn_4: dune height Pn_5: dune width Pn_6: vegetation cover Pn_7: washovers
Natural correction factor (4) (CF_N)	$CF_N = \frac{\frac{\frac{c_{1a}\ c_{1b}}{2}+c_2+c_3+c_4}{n_C}-1}{A-1}$	c_{1a}: significant wave height c_{1b}: angle of wave approach c_2: tidal range c_3: sea-level rise c_4: storm surge
Sensitivity index to natural processes (5) (NSI)	$NSI = EI \times \frac{3}{4} + CF_N \times \frac{1}{4}$	
Human impact index (6) for category II sites (HI_{C2})	$HI_{C2} = \frac{\frac{Ph_1+Ph_2+\frac{Ph_{3a}+Ph_{3b}}{2}}{n_{Ph}}-1}{A-1}$	Ph: human parameter Ph_1: access difficulty Ph_2: protected area management category Ph_{3a}: tourism intensity rate Ph_{3b}: population density n_{Ph}: number of human parameters A: maximum attribute value (5)
Human impact index (7) for category III sites (HI_{C3})	$HI_{C3} = \frac{\frac{Ph_1+Ph_2+\frac{Ph_{3a}+Ph_{3b}}{2}+Ph_4}{n_{Ph}}-1}{A-1}$	Ph_4: beach typology
Human correction factor (8) (CF_H)	$CF_H = \frac{c-1}{A-1}$	*c:* tourism trend
Sensitivity index (9) to human processes (HSI)	$HSI = HI \times \frac{3}{4} + CF_H \times \frac{1}{4}$	
Total sensitivity index (10) (TSI)	$TSI = \frac{NSI+HSI}{2}$	

Table A2. Natural and human parameters ratings at the 52 sites investigated.

Islands		IBIZA										
	Sites	Es Cavallet (0.82)	Cala Ses Salines (0.88)	Ses Salines (0.84)	Cala Llentrisca (0.62)	Cala d'Hort (0.64)	Cala Conta (0.63)	Cala Saladeta (0.72)	Caló de s'Illa (0.68)	Punta de Llevant (0.97)	Aigües Blanques (1.06)	Cala Boix (0.69)
Physical parameters	1	1	2	1	4	3	2	2	2	2	3	3
	2	1	4	1	4	4	3	4	4	5	4	3
	3	1	5	1	5	3	4	4	5	4	5	4
	4	5	5	5	4	5	5	4	4	1	5	5
	5	4	3	3	2	3	2	5	3	1	3	3
	6	5	5	5	4	4	5	4	4	1	4	2
	7	1	4	2	1	1	2	4	1	4	1	1
	8	1	5	3	1	1	3	1	1	5	1	1
	9	1	3	5	1	1	5	1	1	4	1	1
	10	5	1	5	1	1	1	1	1	1	1	1
	11	1	1	1	2	1	1	1	2	1	1	1
	12	4	1	4	4	1	1	1	4	4	4	4
	13	5	5	5	5	5	5	5	5	5	5	5
	14	1	3	3	3	4	4	3	3	3	4	3
	15	4	1	4	2	3	4	1	2	4	4	3
	16	5	5	5	5	5	5	5	5	5	5	5
	17	3	3	5	5	3	2	5	4	2	3	4
	18	1	4	3	1	4	3	3	1	5	4	2
Human parameters	19	4	4	4	5	4	3	4	5	5	4	4
	20	4	5	4	1	4	4	4	3	5	4	4
	21	5	5	5	5	5	5	5	5	5	5	5
	22	5	5	5	5	5	5	5	5	5	5	5
	23	5	5	5	5	4	4	5	5	5	5	5
	24	5	5	5	5	4	5	4	5	5	5	5
	25	4	5	4	5	4	5	4	5	5	4	5
	26	4	5	2	4	1	1	3	4	5	4	1

Islands		FORMENTERA				
	Sites	Punta Alta (0.90)	Pas de n'Adolf (0.98)	Des Trucadors (0.86)	Caló des Morts (0.77)	Cala Es Arenals (0.91)
Physical parameters	1	1	1	1	2	1
	2	1	1	1	4	1
	3	1	1	1	5	1
	4	5	5	5	5	5
	5	3	5	3	2	3
	6	5	5	5	5	5
	7	4	5	4	5	5
	8	3	5	5	5	5
	9	3	3	3	4	3
	10	3	1	4	1	3
	11	1	1	1	1	1
	12	3	3	3	1	3
	13	5	5	5	5	5
	14	4	4	3	4	3
	15	5	4	4	1	4
	16	5	5	5	5	5
	17	3	1	3	1	3
	18	1	3	1	1	4
Human parameters	19	5	5	5	4	5
	20	5	5	5	5	5
	21	5	5	5	5	5
	22	5	5	5	5	5
	23	5	5	5	5	5
	24	5	5	5	5	4
	25	4	4	4	5	4
	26	4	5	4	5	4

Islands		MALLORCA																	
	Sites	Portal Vells 1 (0.62)	Portal Vells 2 (0.63)	Cala Tuent (1.00)	Cala Figuera (0.87)	Cala Murta (0.85)	Formentor (0.77)	Es Coll Baix (1.10)	Es Comú de Muro (0.86)	Arenal d'en Casat (1.05)	Cala Matzoc (0.96)	Cala Torta (0.90)	Cala Agulla (0.56)	Cala Varques (0.81)	Cala Magraner (0.93)	S'Amarador (0.66)	Cala Marmols (0.80)	Es Carbo (0.89)	Es Trenc (0.63)
Physical parameters	1	2	2	2	2	3	1	5	1	1	2	2	1	1	2	2	3	1	1
	2	3	3	3	4	3	1	3	1	1	3	5	1	1	5	3	4	1	1
	3	3	3	2	4	3	1	4	1	1	4	4	1	1	4	4	5	1	1
	4	5	5	4	3	3	5	4	5	5	5	5	5	4	3	5	4	5	5
	5	5	3	5	3	3	3	5	3	3	4	5	5	3	5	5	4	4	3
	6	5	4	3	4	4	5	3	4	4	3	5	5	4	3	5	4	5	5
	7	4	4	1	1	1	1	4	1	3	1	3	2	4	1	1	1	1	2
	8	5	3	1	1	1	1	3	1	5	1	4	3	5	1	1	1	1	3
	9	4	3	1	1	1	1	3	1	3	1	3	3	3	1	1	1	1	5
	10	1	1	1	1	1	1	1	5	5	2	3	4	1	1	5	3	5	5
	11	2	1	3	2	3	1	1	1	1	1	2	1	2	4	2	2	1	1
	12	3	3	5	5	4	4	1	4	4	4	4	1	3	1	3	3	2	2
	13	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	14	4	3	4	4	3	5	4	3	3	3	3	3	3	3	3	4	4	3
	15	2	1	3	3	3	3	3	4	4	3	3	3	3	1	2	1	4	4
	16	5	5	5	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	17	5	5	5	3	5	5	4	4	4	5	4	5	5	4	5	5	5	4
	18	3	4	1	1	2	4	3	1	1	1	3	1	1	1	3	1	1	1
Human parameters	19	4	5	5	5	5	4	5	5	5	5	5	4	5	5	4	5	5	4
	20	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	4	4
	21	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	22	5	5	5	5	5	3	5	5	5	5	5	5	5	5	5	5	5	5
	23	4	5	5	5	4	4	5	5	5	5	5	5	5	5	5	5	5	5
	24	5	5	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	25	3	3	4	5	4	4	5	3	4	5	5	3	5	5	4	5	3	3
	26	1	4	4	5	4	2	5	4	5	5	3	3	4	5	1	5	5	3

Islands		MENORCA																	
	Sites	Cales Coves (0.75)	Cala Llucalari (0.69)	Son Bou (0.72)	Binigaus (1.02)	Cala Mitjana (0.95)	Cala Turqueta (0.86)	Cala des Talaier (0.92)	Son Saura (0.82)	Es Tancats (1.07)	Es Bot (1.13)	Cala del Pilar (0.93)	Cala Pregonda (1.01)	Cala Salairó (0.76)	Cavalleria (0.92)	Mongofra (1.00)	Cala Tortuga (0.86)	Cala Rambles (0.68)	Cala Tamarells des N (0.97)
Physical parameters	1	2	3	1	1	3	2	1	1	1	2	3	1	2	2	2	1	1	1
	2	5	3	1	1	3	5	1	1	1	3	3	1	4	3	4	1	1	1
	3	5	5	1	1	5	3	1	1	1	3	4	1	4	4	4	1	1	1
	4	2	3	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	5	3	3	4	5	5	4	4	3	4	5	4	5	5	3	3	3	2	3
	6	3	4	5	4	5	5	5	5	4	4	4	4	4	4	4	4	3	3
	7	1	1	2	1	1	3	5	3	2	1	1	1	1	2	2	1	1	5
	8	1	1	4	1	1	3	5	3	5	1	1	1	1	5	4	1	1	5
	9	1	1	3	1	1	2	3	3	3	1	1	1	1	3	3	1	1	3
	10	1	1	5	4	4	3	1	5	5	5	4	4	5	5	5	4	4	3
	11	1	1	1	2	2	1	1	1	1	4	2	1	1	1	2	1	1	1
	12	1	1	3	3	3	1	1	2	4	3	4	4	1	1	3	3	3	3
	13	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	14	3	3	3	3	4	3	3	3	4	3	3	5	5	4	4	3	3	4
	15	1	3	4	4	3	1	1	3	3	3	3	3	1	3	3	3	3	3
	16	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	17	5	3	3	5	5	5	4	5	3	4	3	4	3	3	4	4	5	4
	18	1	1	4	3	1	3	3	1	4	5	3	4	3	3	3	1	1	1
Human parameters	19	5	5	5	5	4	4	5	5	4	5	5	5	5	5	5	5	5	5
	20	5	4	5	5	4	4	5	5	5	5	4	4	3	4	4	4	3	4
	21	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	22	5	5	5	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	23	5	5	5	5	5	5	5	5	5	5	5	4	5	5	5	5	5	5
	24	5	5	5	5	5	5	5	5	5	5	5	4	5	5	5	5	5	5
	25	4	5	2	5	5	4	4	4	5	5	5	5	4	5	5	5	5	5
	26	5	5	4	5	4	5	5	4	4	5	5	3	5	4	4	5	5	5

Table A3. Sites values at natural scenic sensitivity parameters (CSSI method).

Sites	Islands	Category	Dry Beach	Sediment	RS Width	RS Location	D. Heigh	D. Width	Veg. Cover	Washovers	EI	Hs	Angle of W.	Tidal Range	SLR	SS	NSI	Group
1. Es Cavallet	Ibiza	III	1	4	5	5	2	2	2	2	0.58	3	1	5	5	1	0.49	II
2. Cala Ses Salines		II	5	5	4	1					0.79	3	5	5	5	1	0.77	III
3. Ses Salines		III	5	5	5	3	1	1	1	1	0.92	3	5	5	5	1	0.63	II
4. Cala Llentrisca		II	1	1	5	5					0.33	3	1	5	5	1	0.39	II
5. Cala d'Hort		II	5	5	5	5					1.00	3	3	5	5	1	0.91	III
6. Cala Comte		II	4	5	4	2					0.75	3	3	5	5	1	0.72	III
7. Cala Saladeta		II	1	5	5	5					0.67	3	1	5	5	1	0.64	II
8. Caló de S'Illa		II	1	1	5	5					0.33	3	1	5	5	1	0.39	II
9. Punta de Llevant		I																I
10. Aigües Blanques		II	2	5	5	5					0.75	3	3	5	5	1	0.72	III
11. Cala Boix		II	1	5	5	5					0.67	3	1	5	5	1	0.64	II
12. Punta Alta	Formentera	III	1	4	5	1	2	3	3	2	0.42	3	3	5	5	1	0.46	II
13. Pas de n'Adolf		II	1	5	4	3					0.54	3	5	5	5	1	0.58	II
14. Des Trucadors		III	5	5	4	3	2	2	2	2	0.88	3	5	5	5	1	0.67	III
15. Caló des Morts		II	5	4	4	1					0.71	3	5	5	5	1	0.70	III
16. Cala Es Arenals		III	1	5	4	3	3	4	3	3	0.54	3	5	5	5	1	0.58	II
17. Portal Vells 1	Mallorca	II	5	5	4	3					0.88	3	1	5	5	1	0.80	III
18. Portal Vells 2		II	4	5	5	3					0.83	3	1	5	5	1	0.77	III
19. Cala Tuent		II	5	1	5	5					0.67	3	1	5	5	1	0.64	II
20. Cala Figuera		II	1	1	4	4					0.25	3	5	5	5	1	0.36	II
21. Cala Murta		II	4	1	5	4					0.54	3	1	5	5	1	0.55	II
22. Formentor		II	5	5	5	5					1.00	3	1	5	5	1	0.89	III
23. Es Coll Baix		II	1	1	5	5					0.33	3	5	5	5	1	0.42	II
24. Es Comú de Muro		III	4	5	5	5	1	1	1	1	0.92	3	5	5	5	1	0.63	II
25. S'Arenal d'en Casat		III	1	4	4	3	2	1	1	1	0.46	3	5	5	5	1	0.42	II
26. Cala Matzoc		II	1	3	5	5					0.50	3	1	5	5	1	0.52	II
27. Cala Torta		III	1	5	5	5	2	3	3	4	0.67	3	5	5	5	1	0.63	II
28. Cala Agulla		III	1	5	5	5	1	2	1	3	0.67	3	3	5	5	1	0.54	II
29. Cala Varques		II	1	5	5	5					0.67	1	1	5	5	1	0.63	II
30. Cala Magraner		II	1	1	5	5					0.33	1	1	5	5	1	0.38	II
31. S'Amarador		III	3	5	5	5	3	3	3	3	0.83	3	1	5	5	1	0.68	III
32. Cala Marmols		III	1	1	5	5	3	5	3	4	0.33	3	1	5	5	1	0.48	II
33. Es Carbo		III	1	3	5	5	1	1	1	2	0.50	3	5	5	5	1	0.44	II
34. Es Trenc		III	5	4	5	5	2	1	1	2	0.92	3	5	5	5	1	0.66	III
35. Cales Coves	Menorca	II	2	3	5	4					0.54	3	1	5	5	1	0.55	II
36. Cala Llucalari		II	5	1	5	5					0.67	1	3	5	5	1	0.64	II
37. Son Bou		III	4	5	4	3	2	2	1	1	0.79	1	5	5	5	1	0.58	II
38. Binigaus		III	5	5	5	5	2	3	2	4	1.00	1	5	5	5	1	0.77	III
39. Cala Mitjana		III	5	5	5	5	3	4	2	4	1.00	1	3	5	5	1	0.78	III
40. Cala Turqueta		III	4	5	4	4	5	5	5	5	0.83	3	1	5	5	1	0.81	III
41. Cala des Talaier		II	5	5	4	4					0.92	3	1	5	5	1	0.83	III
42. Son Saura		III	4	3	4	5	2	1	1	1	0.71	3	5	5	5	1	0.54	II
43. Es Tancats		III	1	5	4	1	1	1	1	1	0.46	5	3	5	5	1	0.40	II
44. Es Bot		III	1	5	5	5	2	2	1	3	0.67	5	1	5	5	1	0.55	II
45. Cala del Pilar		III	2	5	5	5	2	2	2	1	0.75	5	5	5	5	1	0.61	II
46. Cala Pregonda		III	2	5	3	1	2	4	1	2	0.50	5	2	5	5	1	0.49	II
47. Cala Salairó		III	1	5	3	1	1	1	2	4	0.42	5	3	5	5	1	0.44	II
48. Cavalleria		III	4	5	4	1	2	2	2	1	0.71	5	3	5	5	1	0.57	II
49. Mongofra		III	3	5	4	1	1	1	1	2	0.63	3	1	5	5	1	0.47	II
50. Cala Tortuga		III	4	3	5	5	2	2	1	1	0.75	3	1	5	5	1	0.55	II
51. Cala Rambles		III	3	3	5	5	3	2	1	3	0.83	3	3	5	5	1	0.57	II
52. Cala Tamarells des N.		III	1	3	3	3	4	4	2	1	0.42	3	1	5	5	1	0.42	II

Table A4. Sites scores at human scenic sensitivity parameters (CSSI method).

Sites	Municipalities	Islands	Category	Access	PAMC	TIR	PD	Typology	HI	CF	HSI	Group
1. Es Cavallet	San Josep de Sa Talaia	Ibiza	II	3	3	5	3		0.58	2	0.50	II
2. Cala Ses Salines			II	2	3	5	3		0.50	2	0.44	II
3. Ses Salines			III	4	3	5	3	3	0.63	2	0.53	II
4. Cala Llentrisca			II	1	3	5	3		0.42	2	0.38	II
5. Cala d'Hort			III	5	3	5	3	4	0.75	2	0.63	II
6. Cala Comte			III	5	4	5	3	4	0.81	2	0.67	III
7. Cala Saladeta	San Antoni de P.		III	3	4	4	3	3	0.59	2	0.51	II
8. Caló de S'Illa	Sant Joan de Labritja		II	2	3	5	1		0.42	3	0.44	II
9. Punta de Llevant			II	1	3	5	1		0.33	3	0.38	II
10. Aigües Blanques	Santa Eularia des Riu		II	4	4	4	3		0.71	3	0.66	III
11. Cala Boix			III	5	4	4	3	5	0.84	3	0.76	III
12. Punta Alta	Formentera	Formentera	II	1	3	4	2		0.33	3	0.38	II
13. Pas de n'Adolf			II	3	3	4	2		0.50	3	0.50	II
14. Des Trucadors			II	3	3	4	2		0.50	3	0.50	II
15. Caló des Morts			II	3	3	4	2		0.50	3	0.50	II
16. Cala Es Arenals			II	5	4	4	2		0.75	3	0.69	III
17. Portal Vells 1	Calvia	Mallorca	III	5	4	5	4	4	0.84	3	0.76	III
18. Portal Vells 2			II	4	4	5	4		0.79	3	0.72	III
19. Cala Tuent	Escorca		III	3	2	1	1	3	0.31	2	0.30	I
20. Cala Figuera	Pollença		category I									
21. Cala Murta			III	2	2	3	2	3	0.34	3	0.38	II
22. Formentor			III	4	5	3	2	5	0.78	3	0.71	III
23. Es Coll Baix	Alcudia		II	1	3	5	4		0.46	3	0.47	II
24. Es Comú de Muro	Muro		II	3	3	5	2		0.54	3	0.53	II
25. S'Arenal d'en Casat	Santa Margalida		II	2	3	5	2		0.46	3	0.47	II
26. Cala Matzoc	Arta		II	1	3	5	1		0.33	1	0.13	I
27. Cala Torta			II	3	3	5	1		0.50	1	0.25	I
28. Cala Agulla	Capdepera		III	4	3	5	3	3	0.63	3	0.59	II
29. Cala Varques	Manacor		II	2	3	3	3		0.42	3	0.44	II
30. Cala Magraner			II	1	3	3	3		0.33	3	0.38	II
31. S'Amarador	Santanyi		II	3	3	5	2		0.54	2	0.47	II
32. Cala Marmols			II	1	3	5	2		0.38	2	0.34	II
33. Es Carbo	Ses Salines		II	2	3	5	2		0.46	2	0.41	II
34. Es Trenc	Campos		II	3	3	1	2		0.38	5	0.53	II
35. Cales Coves	Alaior	Menorca	II	3	3	5	2		0.54	2	0.47	II
36. Cala Llucalari			II	1	3	5	2		0.38	3	0.41	II
37. Son Bou			II	3	3	5	2		0.54	3	0.53	II
38. Binigaus	Es Migjorn Gran		II	3	3	5	1		0.50	3	0.50	II
39. Cala Mitjana	Ferreries		II	3	3	2	2		0.42	4	0.50	II
40. Cala Turqueta	Ciutadella de Menorca		II	3	3	5	3		0.58	3	0.56	II
41. Cala des Talaier			II	2	3	5	3		0.50	3	0.50	II
42. Son Saura			II	3	3	5	3		0.58	3	0.56	II
43. Es Tancats			II	4	3	5	3		0.67	3	0.63	II
44. Es Bot			II	2	3	5	3		0.50	3	0.50	II
45. Cala del Pilar			II	1	3	5	3		0.42	3	0.44	II
46. Cala Pregonda	Es Mercadal		III	2	3	5	1	3	0.44	3	0.45	II
47. Cala Salairó			II	1	3	5	1		0.33	3	0.38	II
48. Cavalleria			II	3	3	5	1		0.50	3	0.50	II
49. Mongofra	Mahón		category I									
50. Cala Tortuga			II	2	2	1	3		0.25	3	0.31	I
51. Cala Rambles			II	1	2	1	3		0.17	3	0.25	I
52. Cala Tamarells des N.			II	2	2	1	3		0.25	3	0.31	I

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